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VETERINARY NOTES

FOR

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BY

M. HORACE HAYES,

Late Captain "The Buffs,"

AUTHOR OF "A GUIDE TO TRAINING AND HORSE MANAGEMENT IN INDIA,"
"RIDING: ON THE FLAT AND ACROSS COUNTRY,"
ETC.

SECOND EDITION, ENLARGED.

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By the same Author.

A GUIDE TO

TRAINING AND HORSE MANAGEMENT

IN INDIA.

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TO

PROFESSOR WILLIAM WILLIAMS,

F.R.C.V.S., F.R.S.E., Etc.,

AS A

TOKEN OF SINCERE RESPECT FOR HIS LABOURS

IN

THE ADVANCEMENT OF VETERINARY SCIENCE,

AND FOR THE

ADMIRABLE MANNER IN WHICH HE PRESIDES OVER THE

NEW VETERINARY COLLEGE, EDINBURGH.

PREFACE TO THE FIRST EDITION.

This work is the result of an attempt to produce, in a popular and concise form, a treatise on the pathology and treatment of the more frequent diseases of horses.

Whilst specially addressing non-professional readers, my object has been to indicate a rational method of treatment, and not to furnish them with any vaunted nostrums or specifics, which constitute the stock-in-trade of the quack and empiric.

Though I heartily deprecate amateur interference in cases of illness when the aid of a veterinary surgeon can be procured, still I am convinced that the better the principles of veterinary pathology are understood, the more ready will horse owners be to avail themselves of professional experience and ability when disease appears in the stable; and the more attention will they bestow, at other times, on the health and comfort of their dumb servants. Besides this, an owner, especially when abroad, may often find himself with a sick horse on his hands, and no qualified person near from whom to obtain advice.

Whatever merit this work may possess, respecting the treatment of disease, is due to the teaching of the Principal and Professors of the New Veterinary College, Edinburgh, under whom I studied. I am happy to have this opportunity of tendering to them, and especially to Mr. A. Johnston, my very best thanks

for the ready assistance they afforded me at all times in collecting material for the present work. By this, however, I in no way desire to make them responsible for errors into which I may have fallen, but beg my readers, should they discover any, to put them down to my imperfect judgment, for I have adopted no views concerning whose correctness I have not satisfied my own mind.

I am greatly indebted to Professors Vaughan and Johnston for their kindness in revising the proofs, and also to the former for assisting me when drawing the illustrations.

A considerable experience among horses has, I venture to hope, enabled me to utilize the information I have acquired, in meeting and solving many of the difficulties encountered by non-professional readers, while trying to gain knowledge about veterinary matters.

M. H. HAYES.

EDINBURGH,
1*st May*, 1877.

PREFACE TO THE SECOND EDITION.

In the present edition, with the view of facilitating reference, the theoretical remarks have been separated, as much as possible, from the practical details.

To render the work complete, in itself, as a veterinary manual for the use of horse owners who may be unable to obtain professional advice, chapters on the *Detection of lameness*, *Operations*, and on the *Age of the horse as shown by his teeth*, have been added, as well as sections on *Split hoof*, *Osteo-porosis*, *Open joint*, *Wounds of the abdomen*, *Peritonitis*, *Bleeding after castration*, *Scirrhous cord*, *Herniœ*, *Fractures*, *Cataract*, *Theory and practice of feeding horses*, *Inflammation caused by eating sand*, *Constipation*, *Bots*, *Lampas*, *Aphthœ*, *Malarious fever;* while those on *Sprain*, *Mange*, *Bursatee*, *Anthrax or Loodiana fever*, *Rheumatism*, *Weed or Lymphangitis*, *Disease of the liver*, and *Kumree*, have been rewritten. A portion of Chapter XX. has been adapted from Messrs. Peuch and Toussaint's work on *Veterinary Surgery*. Figs. 5, 6, and 13 are new. The author is indebted to Messrs. Bell and Bradfute for kindly allowing him the use of Figs. 4 and 14 from *Strangeways' Veterinary Anatomy* by Professor Vaughan. The remainder of the work has been carefully revised. The index has been made very copious.

The author has to cordially thank Mr. A. Johnston, M.R.C.V.S., for writing Chapter VI. and a great part of that on *Operations*, and for revising Chapter VII. He is glad to have this opportunity of expressing his gratitude to Professor Vaughan for much kindly assistance.

Junior Army and Navy Club,
Grafton St., London, W.
1*st November*, 1880.

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VETERINARY NOTES

CHAPTER I.

Sprains.

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Sketch of the Theory of Sprains.

The structures liable to Sprain are muscles, tendons, and ligaments.

Tendons or Sinews serve the part of strong, inelastic cords to tie muscles down to bones. The tendon, at one end, is spliced on to its muscle, while, at the other end, it adheres firmly to the surface of the bone.

The ligaments we have to consider are similar in their composition to tendons, being made up of strong, dense fibres of white, inelastic material. Their office is to bind together various structures. Thus, in the knee there are two *lateral ligaments*, which are fixed, one on each side of the joint, to the ends of the bones immediately above and below it, so as to prevent it

from having side play. *Capsular ligaments* encircle the ends of the bones which form joints, and thus aid in preventing dislocation. The *suspensory ligament* (see Fig. I.) being connected, at one end, with the head of the cannon bone close behind the knee, and, at the other, with the back of the pastern bones, prevents the fetlock from coming down on the ground when the horse puts weight on the foot. The *check ligament* (see Fig I.), taking its origin from the same place as the suspensory ligament does, and uniting with the inner one of the two back tendons, helps to support the fetlock, and to relieve the muscle of the tendon, with which it is connected, of weight.

The movements of the body are performed by means of the power muscles possess of contracting. Thus, before the foot can be raised—speaking in general terms—the muscles which are connected with the back tendons, and which lie at the back of the forearm, while they take their origin just above the elbow, contract to, say, two-thirds of their natural length, so that the foot, which is connected to the ends of the back tendons, is forcibly pulled up. When these muscles relax, the foot again comes to the ground.

Muscles are composed of fibres which are soft and contractile. That is to say, a muscle has the power—on being stimulated by its nerves—of shortening itself, while it regains its natural length on the stimulus ceasing to act. It is not, however, elastic, because it cannot be stretched beyond its proper length without becoming injured.

Nature of Sprain.—In order to furnish materials for repair of the constant waste which occurs in all living

structures, a vast number of blood-vessels pass among the fibres of which muscles, tendons, and ligaments, are composed. Tendons and ligaments being less plentifully supplied with arteries and veins than muscles are, take a proportionately longer time to recover from injuries, are more liable to become permanently impaired, and seem, from the nature of their structure, to be more readily hurt by undue work.

A sprain consists in the fact of some of the fibres of a part becoming over-stretched, or broken, by reason of excessive, or too long continued, strain, the result being that inflammation is set up.

When *inflammation* takes place, the circulation of blood in the affected part becomes impeded, so that the local blood-vessels become distended. Blood is composed of a number of minute red discs (*red corpuscles*), a watery fluid, and a comparatively small number of colourless discs (*white corpuscles*). The red corpuscles, which impart to the blood its characteristic colour, float, under ordinary conditions, in the centre of the watery fluid. The entire system is supplied with all the materials for repair by this fluid, which holds them in a dissolved state.

The *discs*, to which we have alluded, can be observed singly only by the aid of the microscope.

When inflammation occurs, there is an escape from the *capillaries* (the very fine blood-vessels, which form a connecting network between the arteries and the veins) of a part of the watery fluid into the affected part, which consequently becomes swollen. It appears that, after a short time, most of the actual water of this fluid is absorbed, while its more solid constituents

are quickly transformed into a fluid which possesses the property of becoming solid, and of finally becoming converted into a strong, dense tissue endowed with blood-vessels. Hence, some time after a severe or injudiciously treated sprain, we find the part thickened, and, in the case of a sprained back tendon, "bowed," and more or less shortened, by reason of the newly solidified material, or *exudation*, having come between and separated the fibres of the affected structure, which consequently loses its natural strength and firmness.

Every part of the system is provided with numerous small vessels, called *lymphatics*, whose office is to carry away, into the general circulation, broken up and waste material (*detritus*), which is then got rid of by means of the kidneys, skin, bowels, &c. As the smaller veins, especially those near the surface of the body, also, appear to possess the power of absorption, we may class them and the lymphatics under the general term of *absorbents*.

As long as the exudation remains liquid, the absorbents continue to remove it, but are unable to do so when it becomes coagulated. After attaining this state, it has a tendency, under favourable conditions, to become gradually converted into fat, which, in time, becomes more or less completely absorbed in the form of minute oily drops. This process of repair is called *fatty degeneration.* When, however, the exudation becomes finally organized into a low form of fibrous tissue, it will be little amenable to any process of absorption.

When the amount of the exudation is small, the absorbents will naturally remove it far more readily

than when its quantity is great. If, after a sprain, the animal be kept at work, the continued formation of exudation will, in all probability, be more than the absorbents can remove, the result being that the deposit will become solid and organized, and that the part will become permanently affected. Hence, in a case of sprain, however slight it may be, it is imperative to obtain as complete rest as possible for the injured structures, until they have regained their former strength, or until they have recovered it as far as the nature of the accident will allow them to do so.

The fibres of a structure which are ruptured on the occurrence of a sprain, subsequently unite more or less perfectly, but their continuity is destroyed, unless, indeed, immediate union of the broken ends takes place, like what we see in a clean cut wound that heals without leaving any scar. This favourable union doubtless readily occurs in slight strains of muscles which are largely supplied with blood-vessels, but seldom in cases of sprained tendons or ligaments, which are less plentifully endowed with these means of repair. The broken ends of the fibres of the two last-mentioned structures unite, in ordinary cases, by means of a new material which glues them together, and which assumes the appearance, but lacks the strength and fibrous character, of the original structure.

When a tendon or ligament suffers from frequent sprains, or from long-continued and undue work, the nutrition of the part, owing to the presence of inflammation, is impaired, hence the affected structure loses, in time, its original strength and fibrous nature, and assumes—as observed by Professor Williams—a

gelatinous character, in which state it is ill able to stand hard work. Here again we see the necessity for *rest* after a sprain.

My own experience is that sprains of the tendons and ligaments of the fore legs—which are by far the most common accidents to which horses employed in fast work are liable—come on, as a rule, gradually. The history of the case is usually somewhat as follows. After work, on previous occasions, some heat and tenderness were observed in the affected part. These symptoms more or less subsided after a short rest and by the aid of hot or cold water, a high-heeled shoe, bandages, "cloths," etc., so that the horse was enabled to continue work, off and on, until the day on which the final accident occurred. Here we may easily see that the nutrition of the part, owing to inflammation, however slight, continuing in it for a considerable time, was interfered with, and that the leg was consequently rendered weak. We may take for granted that, when a sprain occurs without warning, it has been caused by some unforeseen accident, as a sudden wrench from stepping on an inequality of the ground, etc.

The thickening left after a sprain is an undoubted sign of weakness, both on account of the "altered nutrition" set up in the part, and on account of the fibres, at the seat of the injury, having become separated one from another by the exudation within, while the external exudation will, by distending the sheath, prevent it from binding down and supporting the structure which it covers. Dealers and other persons, wanting to sell a horse with a thickened back tendon, sometimes try to make out that the leg is as sound as

when the horse was foaled, and will base their assertion on the fact that the tendon has become "callous," an expression which the buyer should understand to mean "incurably weak"; for here we have a stage long past that in which repair was possible. The more work such a horse gets, the weaker and weaker will the affected part most assuredly become.

Principles of Treatment.

From the preceding remarks we learn that the first consideration is to give as perfect *rest* as possible to the affected part.

The pain, resulting from sprain is due to the pressure of the escaped fluid on the nerve fibres, and also to actual injury inflicted on these nerves at the time of the accident.

We use *moist heat* to relieve this internal pressure by causing external swelling, and, indirectly, by hastening the process of absorption. The heat derived from warm water stimulates the action of the sweat-glands, which are imbedded in the skin, and whose office is to secrete a watery fluid—perspiration—from the superficial blood-vessels, which possess the power of absorbing exuded fluid. Hence, the brisker the action of the skin (*i.e.*, of the sweat-glands), the quicker does the swelling in and around a sprained structure subside. As this exudation remains fluid for but a very short time, we should pay special attention to the very early employment of moist heat, either by *bathing* the part with warm water, or by using *fomentations*, which are arranged by applying to the affected

surface flannel, or some other thick, porous material, which has, immediately before, been soaked in hot water, either pure, or in the form of a decoction containing some drug, such as opium.

Moderate heat encourages the process of repair, in the same manner as it does all other forms of growth.

The water should on no account be so hot as to cause irritation of the local nerve fibres, for if that takes place, inflammation of the surface will be set up, while the functions of the skin will become deranged and impeded, instead of being stimulated.

The effect of *cold applications* is to cause contraction of the tissues to which they are applied. Hence, when used over an inflamed part, they tend to cause contraction of its blood-vessels. If this object be duly effected, the congestion of the blood-vessels will naturally cease, the circulation in the part will become restored, and the escape, into the tissues, of watery fluid from the blood, will be checked; hence the inflammation will rapidly subside. This desirable consummation can be hoped for only when the seat of the recently-set-up inflammation is of very limited extent, as in the case of a bump on a person's forehead caused by a slight blow, which bump may be quickly reduced by the application of a cold iron or steel surface. Cold, however, is quite unable to beneficially influence even slight sprains during their acute stage, for the seat of inflammation is too extensive and too deep-seated to be brought under its influence. The application of cold is, on the contrary, probably injurious by reason of its influence in checking the action of the skin.

As we cannot hope to cut short the course of inflammation, in the case of a sprain, we may safely employ moist heat as a means which is well calculated to lead the inflammation to a favourable termination.

Physic acts beneficially by diminishing the congestion of the blood-vessels of the affected part, in that it draws the blood away to the intestines, and lessens the actual volume of that fluid by causing it to lose a part of its water, which is expelled along with the dung; hence the fluid character of the evacuations after an aperient. The blood, being now deprived of this water, gradually makes up the loss from the tissues; thus, the local swelling becomes diminished by the employment of physic. The *detritus*, or broken-up material which results from the constant waste undergone in the body, is, previous to expulsion, held in solution in the blood. Its undue retention poisons the system, and puts it into a so-called *heated* state. Hence, physic purifies the blood by removing some of the watery fluid which holds this *detritus* in a dissolved state. Aperients, also, prevent, especially in the case of a gross horse, the bad effects which might accrue from the absorption of noxious gases given off by the dung before it leaves the intestines. One or two *enemas* may be used as assistants to the physic.

Diuretics (nitre, for instance) purify the blood by stimulating the kidneys, whose office is to get rid of the before-mentioned *detritus* along with the urine. Nitre seems to aid in keeping the blood fluid—an important condition in lessening inflammation.

Laxative food (green fodder, carrots, etc.) has a *cooling* effect: (1) by acting on the bowels; (2) from

being poor in substances (such as albumen) which "heat" the system; (3) from containing certain salts which, on being absorbed into the blood, appear to assist in maintaining its fluidity.

Leeches act locally in relieving the distended condition of the superficial veins.

Sedatives are given to allay pain. *Opium* is the most useful internal sedative; it may also be used externally when dissolved in warm water. *Aconite* calms the action of the heart, which effect may be perceived from the diminished rate of the pulse. *Belladonna*, when applied to the skin, reduces the local congestion by causing contraction of the muscular coats of the blood-vessels. *Camphor* appears to have a soothing effect on the skin, which it undoubtedly has on the mucous membranes. It may be used externally in combination with belladonna.

Pressure may be gradually applied as soon as the heat and pain have subsided, although considerable swelling may still exist; that is to say, as soon as the local circulation of blood is partially restored. Moderate pressure will then—say, a week or ten days after the accident—afford support to the distended vessels—in fact, will tend to reduce them to their natural state of slight contraction; while the local circulation and absorption will consequently become quickened. In the early stages of a sprain, pressure should be most carefully applied, so that the nerve fibres may not be irritated in the slightest; for irritation will certainly be followed by the recurrence of inflammation. If the pressure cause the reappearance of heat and pain, one may be assured that it is doing harm.

After all acute symptoms have subsided, say, in a month, strong continued pressure will cause absorption by diminishing the supply of blood to the part, which, from being insufficiently nourished, will, in time, begin to waste. Thus we see that when a horn tumour is produced in the soft inner layer of the wall of the hoof by the undue pressure of the toe-clip of a shoe, a cavity will be formed in the part of the bone opposite to where the tumour lay. The less organized—that is to say, the less elaborately formed, and the less plentifully supplied with blood-vessels, nerves, &c.—a structure is, the sooner will it waste away and become absorbed; hence pressure which will have little or no effect on a tendon or ligament, will cause the more or less complete removal of an exudation, whose resistance to the process of absorption will be directly proportionate to the degree of organization to which it has attained. The exudation undergoes *fatty degeneration*, to which form of wasting recent formations are particularly liable when the supply of blood to them is curtailed.

As soon as the inflammation has subsided, say, after three weeks or a month, our efforts should be directed to remove the exudation, and to restore tonicity to the part. With these objects in view, we may use pressure, blisters, the firing iron, hand-rubbing, cold water, exercise, bandages, &c.

Blistering and firing are useful in drawing an increased supply of blood to the injured part, so as to hasten the process of repair. They, in fact, by causing active inflammation in the surface which has been blistered or fired, quicken the circulation of blood in

the adjoining tissues, that is to say, in the sprained structures which were lately the seat of inflammation. "It is quite true that a larger amount of blood passes through a limb, of which *some part* is in a state of active inflammation, than passes through the corresponding sound limb; but this is far from indicating 'increased action' in the inflamed part, being dependent upon the augmented flow of blood through the tissues which surround it." (*Carpenter.*)

This increased flow of blood and the rapid chemical changes undergone in a part suffering from inflammation, cause the *rise in temperature* which is one of the symptoms of inflammatory action. *Redness*—another symptom, but one not so readily seen in the horse as in man—is also occasioned by this "rush of blood."

We may reasonably conclude that mild and repeated blisters are, as a rule, far more beneficial than one or two severe ones, or than firing, in that they cause a continued supply of the elements of repair to be brought to the injured part, and are not liable to set up inflammation in it, by doing which they would defeat the object for which they were employed.

Blistering or firing over or near a part in which inflammation already exists, would be but adding fuel to fire. Many a thickened tendon or ligament has been the result of the too early employment of these heroic measures.

Deep firing *may* afford more or less permanent pressure on a sprained tendon or ligament by causing contraction and adhesion of the overlying structures.

The portion of skin or flesh burnt by the firing iron is replaced by fibrous tissue whose property is to

contract. We see this exemplified in the "drawn" appearance of the skin of a person's neck or cheek, which has suffered from a deep burn. Firing necessitates more perfect rest than what blistering would entail.

Hand-rubbing also determines blood to an injured part, and may act—and so may pressure—mechanically in dissipating fluid exudations.

Moderate *exercise* aids in quickening the circulation through the seat of injury, and acts beneficially in maintaining the animal's general health, for the better that is, the quicker will all processes of repair take place. The exercise should, however, be of such a nature that it could not, by any possibility, hurt the already weakened structures.

The *effect of cold* is to cause contraction. Hence, when the blood-vessels of a part are in a distended condition from recent inflammation, we apply cold to restore their vessels to their natural state of slight contraction, and to quicken the impeded circulation.

The application of *cold water* also seems to give tonicity to a sprained part by the reaction it sets up, especially when a strong jet of water is used. If cold be too long applied, the benefit which might have accrued from reaction taking place is lost, while the local circulation is injuriously checked.

Let us glance for a moment at the theoretical considerations which may influence us in the employment of warm and cold bandages.

Warm bandages, or those composed of flannel, when applied to the legs, from the nature of their texture, and from the fact of their material being a bad

conductor of heat, prevent the insensible perspiration which is constantly given off by the skin, from escaping, and retain it, more or less completely, in the form of a cushion of hot vapour, which acts as a continued fomentation, and, also, in some degree by pressure hence the special use of these bandages in reducing the condition known as "filled legs." When the limbs, owing to previous accident or overwork, are in this state, their superficial blood-vessels suffer, more or less, from chronic distension, which causes a large amount of watery fluid to escape into the loose tissues which lie beneath the skin. Exercise will dissipate this dropsical condition, for the time being, by quickening the circulation, by stimulating the action of the skin, by pressure, and by diminishing the amount of water in the blood.

Cold Bandages, or those made of cotton, linen, etc.; are, on the contrary, good conductors of heat and readily absorb perspiration, so that they fail to stimulate the sweat glands, unless, indeed, they be covered by a flannel bandage, or some waterproof material, whose presence will prevent evaporation, and will convert the cold one into a *damp hot bandage*. Cold bandages, therefore, should never be used alone, as they effect none of the objects for which bandages are employed. But when used with water or with a refrigerant lotion, they may be useful for applying cold. With this object in view, these bandages should be put on as a single thickness of cloth and not in several folds—as is commonly done—for the thinner the wetted material is which covers the skin, the more readily will the process of evaporation take place. Keep-

ing a single thickness of cotton constantly wet will entail more trouble than can usually be bestowed on our equine patients, hence, taking also into account the doubtful advantages of cold bandages, we may, as a rule, dispense with their employment.

As a familiar instance of the good effects of woollen material and pressure in preventing "filling," I may instance the fact that if a person commences to constantly wear cotton socks and slippers, or loose shoes—as on board ship—he will soon find great difficulty in getting into his ordinary walking boots; but if he wears thick woollen socks and laced boots, his feet and ankles will keep "fine." Thus it is with horses, whose knees and hocks, however, correspond to our wrists and heels.

Bandages for work are employed for affording support to tendons and ligaments which have been rendered weak by previous accident, or are unduly liable to become sprained, as in the case of young horses. When a man sprains his wrist, the capsular ligament is the usual structure involved. This ligament encircles the joint and tends to maintain the bones in their proper position. Hence, after this accident we find that a tight bandage round the wrist affords great support and comfort. A sprain of the fetlock is a somewhat similar accident in the horse, but from the difficulty in applying to this joint a bandage which will not slip and become loose during movement, we cannot draw an exact parallel between the use of these bandages for horses and for men. In the case of a weak back tendon or suspensory ligament, a bandage cannot afford any *direct* support in the same manner as it does

to an injured capsular ligament; at the same time, however, by drawing the back tendons closer than natural to the cannon bone, it (1) checks the descent of the fetlock and consequently "saves" the suspensory and "check" ligaments; (2), by pressing on the nerves of the tendons, it causes the flexor muscles, to which these tendons are attached, to contract, and to "pick up" the foot quicker than they would do were the bandage absent. Here it again saves the suspensory and "check" ligaments. (3). The horse, feeling the pressure of the bandage, does not extend himself as much, or "sprawl about," as he might do, were it not on his leg. (4). By compressing the fibres of the tendons together, bandages may render them less liable to injury.

I need hardly say that these bandages should be made of some elastic material.

General Treatment for Sprains.

We should give *rest* as quickly and as completely as possible to the affected part. With this object in view, if the injury be in one of the legs, we may apply a *high-heeled shoe*, which is one having calkins about two inches high connected together by an iron bar, so as to afford a firm bearing to the foot and to prevent the calkins from catching in the bedding, etc. As a high-heeled shoe will tend to flex the leg to whose foot it is attached, it will, naturally, aid in giving rest to the tendons and muscles, whose office is to raise the limb from the ground, and also to the ligaments which maintain the stability of the joints when weight is

thrown on the leg. The high-heeled shoe may remain untouched for a month or three weeks, and after that its calkins may be gradually reduced by filing them down.

When it is expedient, though not convenient, to put on a high-heeled shoe, a full supply of sawdust should, if obtainable, be substituted for the ordinary straw bedding, as the animal will be able to assume an easier position for his leg on the former, than on the latter, material.

Slings should be used for horses that are very lame behind, for, when thus affected, they will rarely lie down.

When the horse has been placed in a state of rest, we may give an *enema* or two in order to clear out the lower part of the bowels, and a dose of physic.

Warm water, by means of a large sponge or long bucket, should be used to bathe the sprained part without loss of time. The temperature of the water should not exceed that which can be borne with comfort by the hand of the operator, say, not beyond 115° F.

The local pain may be much relieved by using, instead of water, a decoction made by boiling a dozen or more poppy heads, for an hour or so, in half a gallon of water. If the poppy heads be not procurable, an ounce of opium or extract of belladonna may be substituted for them. Plain warm water may be employed in the first instance, so that valuable time be not lost while the decoction is being got ready.

The bathing should be continued for at least a couple of hours, care being taken not to press upon, or irritate, the seat of injury.

Fomentations may be applied by dipping a piece of flannel or blanketing, suitable to the size of the part, in hot water, wringing it out and putting it on, while it may be covered with some woollen or waterproof material in order to retain the heat. *Spongio-piline*, which is a thick, spongy fabric having one side covered with waterproof composition, will act well on a flat surface. The fomentation, before being put on, should on no account be hotter than what the hand can comfortably bear. Such applications, if neatly arranged, need not be changed for two or three hours. A little care may thus save the attendants labour, and the animal unnecessary annoyance.

After fomenting, the part should be carefully dried, and a little soap linament gently rubbed into it. If the sprain be severe, some of the extract of belladonna, mixed with a little gum to make it adhere, may be smeared over the affected surface.

The bathing with hot water and fomentations should be continued, with as short intervals as convenient, for a week at least, unless indeed the injury be trifling. At night, the damp flannel with its waterproof covering, or the belladonna, may be applied.

One cannot do wrong in continuing the bathing with warm water and the fomentations, as long as any unnatural heat remains.

As damped flannel, covered with waterproof material or with dry flannel, is apt, if constantly applied for several days in succession, to blister the skin, these fomentations should be discontinued as soon as the horse evinces that they are irritating the part.

During the first twenty-four hours, if the pain be

very great, 2 oz. of tincture of opium in a pint of water may be given as a drench. But if there be more fever than pain, which circumstance may be detected by observing that the pulse is quick, hard and full, the following drench may be given:

Fleming's tincture of aconite, 10 drops.
Cold water, 1 pint.

This may be repeated after an interval of three hours. *Laxative food,* such as green grass, lucerne, carrots, bran and linseed mashes, should be given instead of corn. A judicious amount of starving will, as a rule, act most beneficially.

When the sprained part admits of it, pressure should be gradually applied by bandaging over a piece of damped flannel which has been previously placed on the seat of injury.

As long as heat and tenderness exist in the part, the horse should be kept in his stable without any exercise whatsoever.

When the inflammatory stage has passed, which fact may be perceived by the disappearance of all pain and unnatural heat (say, in three weeks after an ordinary sprain), cold water may be applied in order to restore strength to the injured structures, the best means being a jet from a hose, which may be allowed to play on the part for a quarter of an hour, four or five times a day. In India, a water skin or *mussuck* may be substituted for the hose, while the water contained in it may be cooled by placing it in the shade for some time, exposed to the wind. Standing a horse, whose legs are affected, in a running stream for similar periods, is good practice. If he be kept longer in the water than

twenty minutes or so, the circulation in the immersed parts may become impeded.

After the application of cold water, the wetted skin should be dried, rubbed over with a little soap liniment, if procurable, and have a flannel covering put on, or a bandage applied with moderate pressure.

I would not advise the use of *wet cold bandages*, unless, indeed, the owner of the horse can attend to them himself, for they dry quickly, and servants cannot, as a rule, be depended upon to keep them constantly wet and loose. If they be employed, they should consist of only a single fold of thin cotton, so that evaporation may be encouraged as much as possible, for the effect of the cold produced by this evaporation is the sole benefit which can be obtained from their use.

The part should be *hand-rubbed* with more or less pressure a few times every day, care being taken that the skin is dry at the time, for if this precaution be not observed, the hand-rubbing will cause the hair to "come off." After the effects of cold and pressure have been tried for some time—say, for a month or six weeks after the accident—a little of the following mild blister:

Biniodide of Mercury, 1 drachm.
Lard, 3 or 4 oz.

may be rubbed over the place where the sprain occurred, every second or third day, so as to keep the skin rough and scabby, in order that a continued supply of blood may be drawn to the part for the repair of the injury. This application may be persevered with for another three weeks. When the injury is deep-seated, the amount of lard may be reduced to one ounce.

The owner can now exercise his own judgment in working the horse, giving corn, using bandages, putting on a "charge," firing, or in persisting in further treatment.

It is notorious how unsuccessful veterinary practitioners are in the treatment of even slight sprains of the back tendons or suspensory ligaments; while a man may rupture most important structures, as in various dislocations, and yet with a long rest—and without being fired or blistered—may make a perfect recovery; the difference simply being one of rest. Of course it is impossible to keep a horse so completely in repose as one can a human patient; still this is no excuse for working a horse too soon. A great deal of injury is done by the idea that exercise causes absorption, when the legs are still inflamed, or the vessels weak after a sprain. That it causes absorption, for the time being, is quite true, but the legs fill worse than ever, two or three hours afterwards.

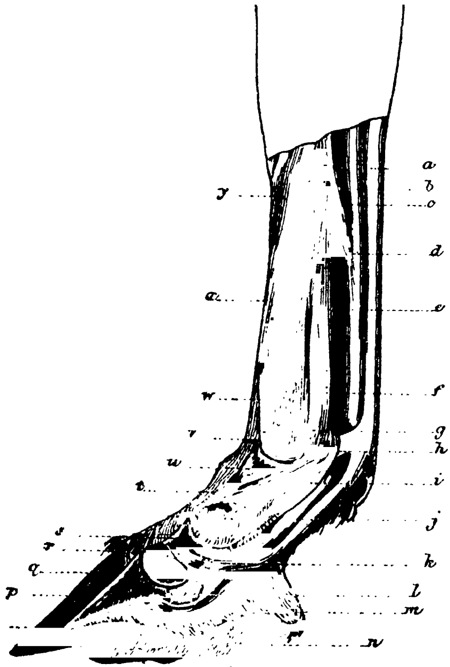
Sprains of the Suspensory Ligament, Check Ligament and Back Tendons.

For convenience sake we will consider these accidents under one heading, after glancing at the position and functions of the involved structures.

Anatomy of the Suspensory Ligaments.—The suspensory ligament (*e*) is a strong, inelastic ligament at the back of and close to the cannon bone. It originates at the head of this bone, and at the lower row of the small bones of the knee; and runs down the groove formed by the two splint bones, for about two-

Fig. 1.

DIAGRAM OF FORE-LEG IN PARTIAL SECTION, WITH SOME OF THE STRUCTURES REMOVED.



a. Perforatus tendon.
b. Perforans tendon.
c. Check ligament.
d. Point of union of *b* and *c*.
e. Suspensory ligament.
f. Point at which *e* becomes generally sprained.
g. Point of attachment of *e* with the sesamoid bones.
h. Sheath of *a*.
i. Inferior sesamoid ligaments.
j. Perforans tendon.
k. Insertion of *a*.
l. Navicular bone.
m. Sensitive frog.
n. Horny frog.
o. Point of pedal bone.
p. Pedal or coffin bone.
q. Sensitive laminæ.
r. Pyramidal process of *p*.
s. Coronary, or short pastern bone.
t. Insertion of *e*.
u. Os suffraginis, or long pastern bone.
v. Sesamoid bones.
w. Cannon bone.
x. Extensor suffraginis.
y. „ pedis.

thirds of the length of the cannon bone, then divides into two branches, which become fixed into the summits of the sesamoid bones—that lie at the back of the fetlock joint—and extend downwards and forwards, again uniting in front of, and at about the middle of the pastern, becoming strongly attached to the tendon of the muscle which extends the foot; this ligament again divides and is finally inserted to the sides of the coronary bone.

Acting by the mechanical advantage afforded by the sesamoid bones, the suspensory ligament serves as a powerful brace for preventing undue extension of the fetlock joint.

Anatomy of the Back Tendons and Check Ligament.—The back tendons are composed of two, which originate from muscles that serve to raise the foot from the ground. From the knee they run down behind the suspensory ligament, one overlying the other. The posterior tendon (*a*) (the perforatus) forms a sheath for the passage of the other (*b*) (the perforans) at the back of the fetlock joint, and becomes attached to the sides of the coronary bone (*s*). The perforans tendon is joined half-way down the cannon bone (*w*) by a powerful ligament (*c*) which originates at the head of that bone, and at the lower row of the small bones of the knee, having, in fact, almost the same origin as the suspensory ligament. This so-called *check* ligament forms with the lower part of the perforans tendon a strong brace for preventing undue obliquity of the pastern, its office being very similar, but less in degree, to that of the suspensory ligament. The perforans tendon, after affording attachment (at *d*) to this check

ligament, passes over the sesamoids (*v*) which act as a pulley for it, then down the back of the pastern bones, over the third sesamoid or navicular bone (*l*) (another pulley), and is finally inserted into the base of the pedal or coffin bone (*p*).

On taking a side view of a well-formed horse's leg, we should see the suspensory ligament rising close above the fetlock joint between the cannon bone and back tendons, and extending nearly two-thirds of the way up to the knee; the skin should be firmly bound down to it, and it should stand clear and well-defined from bone and tendon, as if it were cast in a mould, so that the leg, from knee to fetlock, should have a fluted appearance. When there is a difficulty in marking the course of the ligament with the eye, we may have a grave doubt of the capability of the leg for standing continued fast work.

The tendons and ligaments of some legs, particularly those of underbred horses, are, however, sometimes covered with an unusually large amount of loose tissue, which causes the legs to have a more or less "filled" appearance, without, however, the strength of these structures being affected. The apparent "cleanness," due to absorption consequent on old age, which many stale, worn-out legs exhibit, should not be mistaken for strength and freshness. The condition of the knees and fetlocks will aid the observer in forming a correct judgment on such cases.

As tendons and ligaments are, naturally, almost always sprained at their weakest points, we find that when the suspensory ligament "goes," it usually does so at one or at both of its branches just above the fetlock joint.

The only parts at which, from mechanical considerations, it appears that the perforans tendon can be sprained, are its attachment to the pedal bone, and the point where it passes over the sesamoid bones. On carefully examining the perforatus—the hindmost one of the two back tendons—one may reasonably conclude that it can very rarely indeed become sprained.

Thus we have from undue extension of the foot, as in galloping, or in draught when going down hill with a heavy weight behind, injury of the suspensory and check ligaments, and of the back tendons (perforans). While from excessive labour in flexing the foot—as in galloping through heavy, "holding" ground, especially with a heavy weight up, or in drawing heavy loads—we have sprain of the perforans tendon by reason of the violent strain which is thrown on it by the contraction of its muscle.

Cart-horses are most liable to sprain the check, while those doing fast work usually injure the suspensory ligament. This difference between the cart-horse and the galloper regarding their respective liability to these accidents has not, I believe, before received any satisfactory explanation; it is therefore with some diffidence that I offer to the reader my own views on the subject.

Manner in which the Suspensory Ligament gets sprained in Galloping.—In the gallop, the heel of the fore-foot comes first to the ground. When the horse is fresh and untired, the muscles to which the perforans and perforatus tendons are attached, contract with such precision that the foot is "picked up" (flexed) before undue strain can fall on the suspensory

ligament; in fact, these tendons act as assistant braces to it. But if the pace be continued, the horse will "dwell" more and more in his stride, until the two muscles which move the tendons, having become gradually fatigued, will at length be unable to contract with sufficient quickness to save the suspensory ligament from undue strain; besides this, though the muscles get tired, the ligament does not experience the sensation of fatigue; hence the horse throws increased weight on the latter in order to save the former. We may easily imagine how great this strain must be, in the case of a race-horse struggling home during a desperate finish. When the muscles which flex the fore-legs become tired, a considerable portion of the weight of the horse and his rider, which is propelled forward by the hind, has to be borne by the suspensory ligaments of the fore-legs. No wonder then that race-horses, as a rule, break down within the "distance," especially if the ligament has been previously injured. We also may readily see why they are more apt to break down when out of work than when in condition.

A striking proof that as long as horses are not fatigued they are not apt to sprain their suspensory ligaments, is afforded by the fact that animals, which have been rendered totally unfit for the turf on account of this accident, often make most serviceable chargers for ordinary parades, on which a gallop is seldom required to be made beyond a few hundred yards.

We find in training race-horses with weak suspensory ligaments or back tendons, that the only safe method for giving them fast work is by short and repeated gallops. For instance, instead of sending such

a horse a mile gallop, we might give him three spins of three furlongs each, with intervals of from a quarter to half an hour, in order to allow the muscles to recover their strength and tone.

I think we may take for granted the existence of more or less perfect harmony between the strength of the muscles of the fore and hind extremities, and that, if a horse were turned loose and allowed to gallop, the muscles of the latter would get fatigued as soon, or nearly as soon, as would those of the former. Here the diminished assistance which is afforded by the perforans and perforatus tendons to the suspensory ligaments, would, when their muscles became tired, be compensated for by the decreased strain of the slower pace. But if we put a jockey up, this harmony is at once destroyed, for then, the weight being thrown forward by the position assumed in riding, the flexor muscles of the fore-legs will have far more work to do, in proportion, than the muscles of the hind, and will consequently become more quickly fatigued.

When a horse is galloped on hard ground, the sudden jar experienced at each stride is very apt to strain some of the fibres of the ligament, and thus to bring on the gelatinous condition to which we have previously alluded. Soft ground gives more time for the muscles which are attached to the perforans and perforatus tendons to contract, and thus to save the ligament; while on hard ground, the severe strain falls on it with extreme rapidity; hence the danger of inducing sprain of the suspensory ligaments by galloping on such soil.

Both from theoretical considerations, and from

practical observations, I think I may lay it down as a rule that the suspensory ligaments of saddle-horses do not get sprained, except when the flexor muscles of the fore-legs become fatigued in the gallop, or when the animal is worked on hard ground. The exceptions will probably be included among cases where undue or unexpected extension of the foot takes place from the horse treading on some inequality, or from landing on a hard spot when leaping. The lessons to be drawn from these considerations are too obvious to need detail.

Oblique Pasterns.—The longer and more oblique the pasterns are, the less liability is there of the horse spraining his suspensory ligaments on hard ground, because this conformation enjoys a greater freedom from concussion than the more upright shape. Hence we find in India, where the "going" is very hard, that oblique pasterns are almost indispensable for horses which have to do fast work in that country. With oblique pasterns, the suspensory ligament acts at a certain mechanical disadvantage, which is more or less compensated by the greater freedom from concussion. When the ground is soft and level, the balance is, naturally, in favour of the more upright form; which is particularly bad for going down hill, for the weight, then, being thrown forward, jars the ligament at every stride. This is well understood by racing men, who always entertain the greatest prejudice against a horse with upright pasterns, when he is called upon to race down a hill.

In training horses with weak suspensory ligaments or back tendons, the work, if possible, should only be given up an incline.

Obliquity of the pasterns is chiefly obtained by increased length of the pastern bones.

In horses that are used for fast work, sprain of the suspensory ligament is nearly always confined to the fore-legs.

Sprain of the Suspensory Ligament in Cart-horses.—This rather rare accident with these animals generally occurs in the hind legs, and is due to extreme extension of the foot, as when going down hill with a heavy weight behind. Cart-horses with oblique pasterns appear to be more liable to this injury than are those which are differently formed. Here we have the ill effects of a mechanical disadvantage.

Symptoms of Sprain of the Suspensory Ligament.—As before said, this accident usually occurs at one or both of the branches of the ligament, a little above the fetlock joint. In simple sprain, there is heat and swelling of the part. If the injury be but slight, the horse will stand level and will walk fairly well, but the lameness at the trot will be disproportionately great to that at the walk; if the case be severe, there will be considerable lameness, the toe only being brought to the ground. When there is rupture of the ligament, the fetlock pad comes down and the toe turns up, owing to the fetlock losing its powerful inelastic brace. If one branch of the ligament only is severed, the descent of the fetlock pad will be more partial. Rupture of the suspensory ligament is the accident which is termed "*a break down.*"

Sprain of the Check Ligament.—This injury is common among cart-horses. It also occurs to saddle-horses, in which cases it appears to be invariably the

result of a sudden jerk, caused by the animal placing his foot on some inequality of the ground. I have known several instances of it happening to race-horses that were exercised on courses which were cut up in places by cattle crossing them. Sprain of the suspensory ligament, on the contrary, almost always takes place when a horse begins to tire in his gallop. As I have pointed out before, this ligament, in connection with the portion of the perforans tendon beneath it, serves as an assistant brace to the suspensory ligament, which may become severed, and the fetlock pad may come to the ground, without the check ligament being sprained at all. That the sprain must occur when weight is thrown on the foot is evident, because the moment the foot is flexed the check ligament is thrown into a state of rest. Again, it rarely happens during the gallop on level ground, at which pace there is extreme extension of the foot at each stride. Hence it strikes me that the usual manner in which it gets sprained is by a sudden snap or jerk, at a time when the upper portion of the perforans tendon is relaxed, so that the whole of the shock has to be borne by this ligament alone. I offer the following explanation.

In the case of a sound horse walking at ease, or going down hill with a heavy load behind him, the heel first comes to the ground, then the toe, the heel is now raised, and finally the foot quits the ground; but when a horse is moving a weight which taxes his strength considerably—particularly when drawing it up hill—the toe first meets the ground, at which moment the flexor muscles are contracted, the tendons are in a state of tension, and the check ligament is at rest;

but as the weight is overcome, at each step, the flexor muscles are suddenly relaxed, and the heel is brought down to the ground with a quick jerk, which is communicated to the check ligament, at a time when it is unassisted, in bearing the strain, by the upper portion of the perforans tendon.

The more the horse's strength is taxed, the higher will the heel be raised from the ground on the toe first touching it, and the greater the consequent jerk will the check ligament receive. The steeper the hill the horse faces, the longer space will the heel fall through before it reaches the ground, and, naturally, the greater will be the strain on the check ligament. If we raise the heel by calkins, or by thick-heeled shoes, we shall thereby shorten the distance through which the heel falls, and shall, consequently, diminish the liability to sprain. Practical experience teaches the advisability of this proceeding. Again, experience proves that sprains of this ligament are more apt to occur going up hill in draught than on level ground, while they hardly, if ever, happen going down hill, that being a mode of progression in which the suspensory ligaments are particularly liable to suffer.

The foregoing remarks on the manner in which this ligament becomes sprained in heavy draught, at a walk, would, I submit, lead us to the conclusion that when this accident occurs at a fast pace, it must do so by reason of a jerk caused by the toe first coming on the ground while the heel is unsupported; for instance, when the horse puts his toe on a stone or small mound of hardened earth.

Sprain of this check ligament constitutes what is commonly called *sprain or clap of the back sinews.*

Symptoms of Sprain of the Check Ligament.—As sprain of this ligament usually occurs at its junction with the perforans tendon, there will be more or less swelling at the upper half of the leg between the knee and fetlock. Soon after the accident occurs, the ligament becomes hot, tender and swollen, a condition which may be perceived by passing the fingers over the part that lies between the back tendons and the cannon bone, and extends from immediately below the knee to about one-third of the way down towards the fetlock. We may readily determine the seat of the injury from observing that the back tendons and suspensory ligament are quite unaffected in the first instance. In a day or two the back tendons, viewing them sideways, assume a more or less "bowed" appearance, by reason of the inflammation extending to the point where the ligament joins them, while, later on, the lower part of the tendon may also become affected. In mild cases of injury to this ligament, the symptoms are heat and fulness of the part just below the knee and but a trifling degree of lameness.

"Frequently, in slight sprains, it is not until the day following that on which the accident happened that any swelling is discoverable." (*Percivall.*) In severe cases there is marked lameness, while the horse, when standing, rests his toe on the ground in order to throw the injured ligament into a state of rest.

After a bad sprain we often find a permanent thickening, somewhat in the form of a knot, at the point where the ligament joins the tendon (about three inches below the knee). The existence of such a thickening materially detracts from the value of the

animal. At other times, there is a permanent fulness of the ligament just below the knee, and generally more on the inner than on the outer side of the leg, without there being any appearance of a knot on the back tendons.

Sprain of the Back Tendons.—The perforans tendon is generally sprained at the point where it passes over the fetlock. If the injury be severe the inflammation will generally extend to the perforatus. There is usually a great deal of swelling above the fetlock joint, accompanied by heat, pain, and lameness. In the early stages, the seat of the sprain may be detected by tracing the tendons with the fingers.

According to Professor Dick, rupture of some of the fibres of the perforans tendon at its attachment to the pedal bone is a frequent cause of navicular disease. This is now generally considered to be a result, and not a cause of that complaint.

The apparent sprain of the back tendons which seems to occur about midway between the knee and the fetlock joint, and which is usually followed by more or less of a " bow," is most probably the result of a blow inflicted by the hind foot, and not a sprain at all, as it is almost impossible from its structure that the perforatus tendon should be sprained at that point. Here the use of leeches is plainly indicated.

Sprain of the Sheath of the Back Tendons.—This term is usually applied to a swollen condition of the back tendons, from the knee to the fetlock, accompanied by heat. In slight cases there may be no lameness, only a little thickening all the way down. This accident is generally brought on by galloping on

heavy ground. It seems difficult to imagine how the sheath could be sprained, without the tendons being seriously involved at the same time. I regard the term as an ingenious expression for making light of a most grave accident. There is always present more or less of a "bow," sometimes so slight as to escape notice except by that of a practised eye.

General Treatment for Sprain of the Suspensory Ligament, Check Ligament, and Back Tendons.

In treating these accidents, the inexperienced horse owner need not concern himself much, if he is unable to determine the actual seat of the injury; indeed, it will be sufficient for all practical purposes if he can find that some one or other of these structures is involved, as the general treatment applicable to any one, when in a sprained condition, is equally suitable for any of the others in a like state.

If the horse stands "level," take off all four shoes; but if he does not, then apply a high-heeled shoe, or put him into slings, if the urgency of the case demands them. Give physic and laxative food, bathe with warm water and foment as directed under "General Treatment of Sprains."

In "a break down," *i.e.*, rupture of the suspensory ligament, apply "firm pledgets of tow placed in the hollow of the heel, to support the fetlock, maintained in their position by firm bandaging. The tow should be made into a firm roll, the fetlock pad elevated by an assistant, the roll of tow placed under it so as to completely fill up the hollow of the heel, and fixed in that

position by a bandage. Other bandages should be placed round the leg as high as possible, to keep the parts together, and thus diminish the breach to be healed." (*Williams.*) After this accident a horse can never become fit for fast work again, but may do for slow. There always remains a swelling just above the fetlock, which gives the joint a peculiarly rounded look.

The fomentations may be arranged by taking a piece of flannel or soft cotton material, folding it a few times till it is of a proper size and thickness, dipping it in hot water, applying it to the part, and then covering it over with oil silk and a dry flannel bandage, or the latter by itself if the former be not obtainable. To guard against the possibility of putting on the fomentation too hot, the operator should try if he can retain it comfortably in his hand before he applies it. This fomentation will not require renewing for a couple of hours at least. It may be left on all night.

A flannel bandage for stable use should be about 8 feet long and 4½ inches wide. It should be of thick, close material, such as that used for cricketing suits. Serge should not be employed. Bandages, without hemming, and specially made for the purpose, are supplied by all saddlers. These are often neither long enough, nor of sufficient substance. When rolling up a bandage, to be ready for immediate use, it should be wound over the tapes, which ought to be turned inwards, in the first instance. When putting it on the leg, the rolled-up part is kept turned to the outside, so that the tapes may come right. The bandaging is commenced about the centre of the cannon bone, carried, in neat folds, down to the fetlock, then up to a

trifle below the knee, and is finished off at the place where it commenced. Nothing now remains but to tie the tapes. When the bandage has to be carried below the fetlock, it will have to be reversed a few times so as to make it lie close. The number of reversions should be even, in order to have the tapes on the outside when the bandaging is completed.

At first the bandages should be put on very loosely, so as to avoid irritating the inflamed part.

After a few days, the effects of moderate pressure may be tried. This is best done by dipping a rolled-up flannel bandage into hot water, wringing out the extra water, and quickly rolling it with the requisite tightness round the affected limb, while over it a dry flannel bandage is put on. After a week or so, cold water may be used instead of hot for wetting the inner bandage, which need not, then, be removed oftener than once a day. Even when using cold water, the heat of the leg quickly raises it to its own temperature. The reaction set up by the application of cold water, in this case, is very probably beneficial. When the part is acutely inflamed, it is unable to respond to the action of cold; hence I would advise that hot water only be employed in the acute stage.

When all tenderness and unnatural heat have passed off, apply cold water, as before directed, for three weeks or a month, as the case may require, and keep a tight flannel bandage on the affected part during the intervals. An elastic bandage 6 feet long, and made of the material used by shoemakers, may with advantage be employed in place of the flannel one. Pressure on the suspensory or "check" ligaments may be regulated by

placing a suitable quantity of wool, or cotton wool, on each side, underneath the bandage. If there still remain any "thickening," we may put on a "charge," which is an adhesive plaster that may be arranged as follows. Take, as prescribed by Morton—

Burgundy pitch - - -	4 oz.
Beeswax - - - - - -	4 ,,

melt them together and stir in 2 oz. of mercurial ointment. Apply the mixture (taking care it is not too hot) to the leg by means of a stiff painter's brush, so that a thick coating shall cover the back tendons and fill up the depressions on each side. Dab on from time to time flocks of cotton wool or tow, and complete the application so that the desired pressure may be afterwards obtained. Over the coating thus put on, roll tightly a cotton bandage (8 feet long by $3\frac{1}{2}$ inches wide), between whose folds the mixture is to be freely plastered so as to make it set firmly. The bandage is finally secured by tapes or by sewing. As it works loose, from time to time, it may be partly unrolled and then bound up afresh.

A charge acts as a continued poultice, and also by pressure. The mercury, very possibly, has a beneficial effect in stimulating the absorbents.

It may be kept on for a month. If it remains on much longer, it is apt to make the skin sore.

I am well aware that in recommending such an old-fashioned remedy as a charge, I run the risk of incurring the ridicule of many who hold advanced ideas on veterinary treatment; I have, however, too frequently seen the good results obtained from its application, to discard its use for sentimental reasons.

If, after the charge comes off, there still remains any thickening, rub in a little

Biniodide of mercury - -	1 drachm.
Lard - - - - - -	4 oz.

every second day or so for a month, regulating the stimulating effect, so that the skin may be kept rough and only slightly scabby. By this means there will be a continued, but not excessive, supply of blood brought to the part for the purposes of repair. I have found this method, in such cases, much superior to more severe measures.

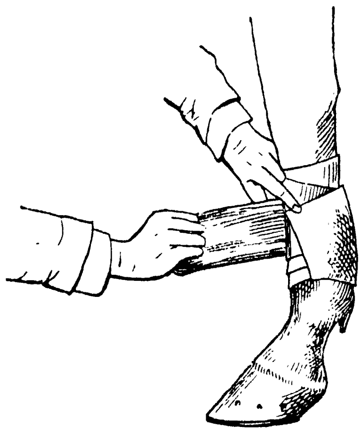
If the use of a charge be objected to, the cold applications may be continued for, say, a month longer than I have directed; while, during the intervals, pressure should be applied by means of carefully-adjusted bandages. Afterwards, the part may be stimulated by the weak biniodide of mercury ointment.

After all, the principal thing is a *long and complete rest.*

Precautions to be observed when working horses which have suffered from sprain of the tendons or ligaments.—After a sprain, a bandage should be used to afford support for the affected structures. If the animal is required for fast work, as in the case of a hunter or race-horse, some nicety of arrangement is requisite in order to prevent the loose end of the bandage working free. This accident is very apt to occur, especially with an elastic bandage, when the animal is galloping, if it is put on in the ordinary manner. When the bandage thus becomes unrolled, and remains attached to the leg only by the tape, it is very apt to trip the horse up. To obviate the chance of such an accident

occurring, the following excellent method for securing any kind of bandage might be employed (see Fig. 2). Commence by laying the loose end diagonally across the fetlock with its extremity a little below that joint; then take about four turns round the leg so that the bandage may come close below the knee, take another turn in a downward direction, bring the loose end up and lay it flat against the bandaged part, and continue

Fig. 2.



the turns over it. The loose end will now be firmly secured between the cloth on both sides. When put on according to this plan, the bandage cannot become undone unless the tape breaks.

One should avoid giving such horses work which is both fast and long. If it has to be fast, it should be short; if long it ought to be slow. Half-mile gallops, or three furlongs, repeated a couple of times, with half an hour's rest between, and not oftener than three times a

week, will generally be as much as a race-horse, rendered infirm by a sprain, can safely stand. If he shows signs of heat or tenderness after a "spin," it should not be repeated till these symptoms have disappeared. The ground on which such screws ought to be worked should be soft, springy, free from inequalities and up a gentle incline. Hard, "holding," or slippery ground is ticularly dangerous. If the horse is used for heavy draught, he ought to be shod with calkins; if for light harness or saddle-work, his toes should be kept low and his heels allowed to grow down a little, or he may be shod with thick-heeled shoes, if his heels are naturally weak, so that, in any case, the slope of his fore-feet to the front may not be *less* than 55°, nor that of the hind than 60°.

After work, a flannel bandage may be dipped in hot water, wrung nearly dry by squeezing it in a towel, and then quickly rolled round the affected part; while over it a dry flannel bandage may be applied moderately tight. This is an excellent application, when left on all night, for "dicky" legs.

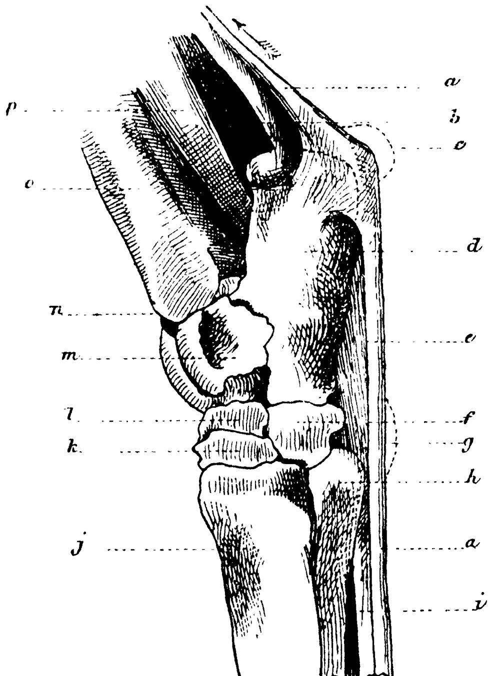
Curb

Is a peculiar sprain of the hock, which causes a swelling to appear to the rear of that joint, and about five inches below its point (see Fig. 3).

Anatomy and nature of curb.—If we regard the bones of the hock (*vide* Fig. 3), we shall see that the true joint is formed by the tibia (*o*) and astragalus (*m*), which latter bone rests on the cuneiform magnum (*l*), while behind it is attached the os calcis (*d*), which is supported on the cuboid bone (*f*). The office of the

Fig. 3.

DIAGRAM OF OUTSIDE ASPECT OF NEAR HOCK, WITH SOME OF THE STRUCTURES REMOVED.



a. Perforatus tendon.
b. Seat of thoroughpin.
c. Seat of capped hock.
d. Os calcis.
e. Calcaneo-cuboid ligament.
f. Cuboid bone.
g. Seat of curb.
h. External splint bone.
i. Perforans tendon.
j. Cannon-bone.
k. Cuneiform medium.
l. Cuneiform magnum.
m. Astragalus.
n. True hock joint.
o. Tibia.
p. Perforans muscle.

os calcis is to serve as a pulley for the perforatus tendon (*a*), which is firmly connected to the head of this bone, and as a lever for the tendon of the chief extensor muscle of the hock joint. I have marked the direction in which this tendon acts by an arrow-head. In order to keep the os calcis in its place, there is a very powerful ligament (*e*) (the calcaneo cuboid) attached to its posterior aspect, and finally inserted to the back of the cuboid bone and to the head of the external splint bone (*h*). The action of this ligament is directly opposed to that of the two before-named muscles when they are used in galloping, leaping, &c. Professor Spooner appears to have been the first to ascribe the cause of curb to sprain of this ligament. I have seen the truth of this theory clearly demonstrated by actual dissections, which showed, in cases that had suffered from curb, marked injury to the ligament, with change, at the seat of sprain, of the fibrous character of the ligament to that of a gelatinous condition. Professor Pritchard, in an article which he read before the Liverpool Veterinary Medical Association —see *The Veterinary Journal* for May, 1879—maintains that curb is due to inflammation of the synovial membrane which lies in front of the perforatus tendon, and saves it from friction with the structures of the joint; and that the cause of the injury is excessive bending of the hock. I may remark, in passing, that synovial membranes are closed sacs which secrete a lubricating fluid—synovia, commonly called joint oil. Professor Pritchard argued, with much force, that if the calcaneo-cuboid ligament was the part sprained, recovery would seldom take place, it being such an

important structure; while the fact is that horses get cured of the lameness of curb without being stopped in their work. Again, the position of curb is that of the synovial membrane in question. I may ask if curb may not occur in both ways—by sprain of the ligament, and also by injury to the synovial membrane? Might not inflammation in the latter structure extend to the former, and produce in it the changes which have been observed?

Owing to the inflammation resulting from this sprain, an effusion about the part takes place, which causes the perforatus tendon to bulge outwards. This swelling, which is of varying size, appears generally about five inches below the point of the os calcis, on the back part of the hock.

To detect a curb properly, the observer should view the leg in profile, and should let his eye run from the point of the hock down the back of the joint. If he finds that this line is straight and without a bulge at any part, and that the horse is not lame, he may conclude that he is free from curb. A view from both the off and near sides should be taken.

The tendon being hard and dense, the swelling caused by curb often appears like a small bony lump.

The ordinary look of a curb is well described by Mr. Percivall:—"The tumour, or prominence rather, rising imperceptibly out of the surface, at a distance of from three to four inches below the point of the hock, gradually increases to the extent of one and a half or two inches, and from its middle or most prominent part as gradually decreases, vanishing in the surface of the skin in the same manner in which it took its rise therefrom."

A horse is said to have *curby hocks* when the head of the external splint bone (see Fig. 3) is unusually large. When this shape exists, a bulge, resembling that caused by the presence of curb, may be observed, if an outside view of the hock be taken, though it will not be apparent when the joint is regarded from the other side. The observer may satisfy himself by running his fingers down the back of the perforatus tendon.

Curby hocks are not an unsoundness. "A defect in the form of a horse at the time of sale, although it might render the horse more liable to become lame at some future time, was not a breach of warranty." Summing up of the judge in Brown *v.* Elkington (S. M. & W., 132), quoted by Lascelles in his "Horse Warranty."

A hock whose os calcis is long appears, by reason of the existence of undue leverage, to be the form which is most liable to curb.

Animals which have suffered from curb ought not to be used for stud purposes, as a tendency to this ailment seems to be often transmitted to the offspring. "Curb is apt to cause lameness in young horses, or, when of fresh origin, in horses of any age; curbs of long standing, being merely the remains of former disease, very seldom cause lameness, and are very often considered by men of experience not to be an unsoundness. . . An aged horse, when suffering from curb lameness, is generally sound again in a few weeks; but if the patient be a young horse, whose bones are not fully consolidated, it takes a much longer time before the parts are restored; and if such a one be put to work before they are thoroughly repaired and strengthened, lameness will in all probability recur." (*Williams.*)

Legally, a curb is an unsoundness, whether a horse is lame from it or not.

"Horses liable to curb should be shod with a shoe high in the heel." (*Williams.*)

Men wishing to sell a horse which has curb, sometimes try to make out that the swelling is simply the result of a blow. If it had occurred in this manner, the swelling would be superficial, and not deep-seated. Horses sometimes knock their hocks near the seat of curb, when jumping stone walls, etc.

The rounded appearance of a curb will guide us in distinguishing it from any unnaturally developed points of bone which may be near the part.

In severe curb lameness, the horse, to avoid throwing pressure on the inflamed part, keeps the limb raised and the tendon relaxed.

Treatment.—Put on a high-heeled shoe, give complete rest, administer a dose of physic, apply continued fomentations, and bathe the part frequently with warm water.

After the inflammation has subsided blister with—

Biniodide of mercury - - -	1 part.
Lard - - - - - - -	8 parts.

In hot climates the amount of lard should be doubled.

This blister may be repeated once or twice, with intervals of at least a fortnight.

When a rest cannot be conveniently given to the horse, some of the biniodide of mercury ointment (1 to 24 of lard) may be rubbed into the affected part, every day or every second day, until a thick scurf be produced, which may, as Professor Pritchard states, have a beneficial effect by producing pressure. Or a solution

of 1 drachm of corrosive sublimate to 4 ounces of spirits of wine may be employed for a like purpose. As a rule, horses are not thrown out of work on account of springing a curb.

In obstinate cases, fire in horizontal lines, so as to blemish as slightly as possible.

A long rest is the only certain cure. (See "General Treatment of Sprains.")

Sprung Hock.

Anatomy.—Between the bones of the hock there are powerful ligaments (inter-osseous), which serve to bind them together. By a very violent strain these ligaments may become sprained, as well as the annular ligament which passes round the hock, and also the back tendon (the perforans) which passes through the tarsal groove (see Fig. 11). This very serious accident is called sprung hock.

There is extreme lameness, and great swelling both above and below the inner and back aspect of the hock. "The tendon is bound down at the tarsal groove by the posterior annular ligament, thus preventing the swelling from appearing except above and below." (*Williams.*)

I have seen a few cases of slight sprain of the ligaments of the hock, which were characterized by heat at the front part of the joint with lameness. They were caused by the horse's foot getting caught in a fence when jumping.

In sprung hock there is high fever and very great pain.

Treatment.—Put the animal into slings, for the injury being in a hind leg he will not lie down to rest. Give physic. Remove the shoe in order to relieve the limb of its weight. Use warm fomentations of poppy-heads or opium, and treat as directed under "General Treatment of Sprains."

After this accident, the animal should have about eight or nine months' rest. If he get this, he will probably make a good recovery.

Sprain of the Fetlock Joint.

Anatomy.—About this complex joint we have various parts which are liable to injury; such as the lateral and capsular ligaments, the inferior ligaments of the sesamoid bones (see Fig. 1), the suspensory ligaments, and the part of the flexor tendon which plays over the sesamoid bones. Injury to these parts causes inflammation of the different synovial bursæ, so that, as a result of sprain, we get a puffed and rounded appearance of the fetlock joint. An intending purchaser should be most careful to note such a condition. The non-professional observer will find that "it is extremely difficult, if not impossible, to define what parts, in a joint made up of so many as the fetlock is, are most or especially diseased, and in what disease in its several stages precisely consists." (*Percivall.*)

Sesamoiditis is inflammation of the synovial bursa which lies between the sesamoid bones and the perforans tendon (see Fig. 1). It is a sort of hard thoroughpin at the back of the fetlock. Although the swelling will go from one side to the other on pressure, it is

hard, because the part admits of little room for distention. This is a most intractable disorder. Professor Williams points out that wind-galls are soft, and that "this difference in the character of the two enlargements must be remembered, as wind-galls are often found involving this bursa."

"*Knuckling over*," as a result of hard work, appears to be due to relaxation of the capsular and lateral ligaments of the fetlock joint.

Symptoms.—Local pain, heat, and swelling; the toe only rests on the ground.

Treatment.—Apply a high-heeled shoe, and act according to "General Treatment of Sprains." In bad cases, as the inflammation is deep-seated, apply the following strong blister:—

Biniodide of mercury - - -	1 part.
Lard - - - - - -	8 parts.

When a fetlock is round and puffy without inflammation, much good may be derived from pressure applied by means of an elastic bandage. This pressure should be continued for at least a month.

Sprain of the Inferior Sesamoid Ligaments.

These ligaments—three in number—proceed from the base of the sesamoid bones, and connect them with the pastern bones—*os corona* and *os suffraginis* (see Fig. 1.) Their office is to prevent the sesamoid bones from being pulled upwards by the pressure exerted on them by the back tendons when weight is thrown on the foot. This sprain is a very serious accident. The part is hot and tender, while the synovial sac which is at the

back of the pastern, and immediately below the fetlock joint, is distended with fluid. The horse endeavours to relieve the injured structures by keeping the fetlock joint bent, and tries to avoid bringing the heel to the ground. There is great lameness.

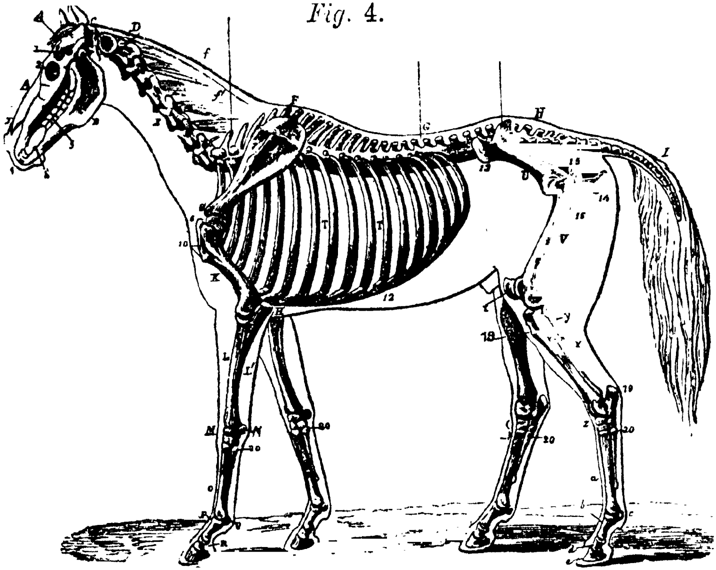
Treatment.—Put on a high-heeled shoe, and treat as directed under "General Treatment of Sprains."

Shoulder Sprain and Shoulder Slip.

Anatomy.—The shoulder joint is formed by the shoulder-blade (the *scapula*), and the short, thick bone (the *humerus*) which is placed between the shoulder joint (commonly called the point of the shoulder) and the elbow. This ball-and-socket joint being designed to possess great powers of extension and flexion, as well as considerable side-play, is bound down by only one ligament (the capsular), while certain muscles pass over it and act as binding ligaments in preventing it from bulging outwards. When sprain of these muscles occurs, they lose their power of contracting, and hence the head of the humerus is seen to bulge out at each step. This condition is called "shoulder slip," and is generally found in young horses that have been employed in ploughing at too early an age. The muscles of the shoulder quickly waste, as they are plentifully supplied with blood-vessels, and reveal the position of the spine of the shoulder-blade, which is a bony ridge that stands out at right angles to the outward surface of the shoulder-blade, and divides it into two portions.

"This atrophy is different from that wasting of the shoulders seen in chronic foot lameness. In the one

Fig. 4.



SKELETON OF HORSE *(after Megnin).*

A Temporal fossa.
B Lower jaw.
C Atlas.
D Dentata.
E Cervical vertebræ.
F Dorsal do.
G Lumbar do.
H Sacral do.
I Coccygeal do.
J Scapula.
K Humerus.
L Radius.
L1 Ulna.
M Knee.
N Trapezium.
O Cannon bone.
P Os suffraginis.
Q Sesamoids.
R Os coronæ.
S Os pedis.
T T Ribs.
U Ilium.
V Femur.
X Knee cap.
Y Tibia.
Z Hock.
a Cannon bone.
f Neck ligament.
y Fibula.
2 Eye cavity.
4 Incisor teeth.
4_1 Tushes.
5 Molar teeth.
6 Head of humerus.
7 7 Shoulder blade. (*Scapula*).
8 Point of shoulder.
9 Cartilage.
10 Humerus.
12 Rib cartilage.
13 Point of hip. (*Anterior iliac spine*).
14 Ischium.
15 Hip joint.
18 Stifle.
19 Point of hock.
20 Splint bones.

case (that of shoulder slip) the muscles of the external surface of the scapula only are wasted, whilst in the other all the muscles of the shoulder and arm are in that condition." (*Williams.*)

There is a large muscle (*flexor brachii*) which takes its origin at the head of the shoulder-blade, passes over the shoulder joint, and is attached to the head of the bone of the fore-arm (the *radius*). Its office is to raise the fore-arm. When it becomes sprained, the animal naturally drags his leg—a peculiarity of gait which also occurs when the lameness is due to disease of the shoulder joint.

"The gait of shoulder lameness is indicative of the seat of the disease. The patient does not carry his limb straight forward, but with a rotary motion, the limb being thrown outwards, and the toe made to form the segment of a circle." (*Williams.*)

The animal drags his toe along the ground, and winces with pain when bringing his foot to the front, and not in putting it down. He will show pain when the limb is lifted up and drawn forward. Here, care should be taken that restiveness is not mistaken for soreness. The absence of pain in the knee or elbow may readily be perceived by manipulating those joints. That the ailment which causes the lameness is not located in the foot or lower portion of the leg may be ascertained from the fact that there is neither heat nor pain present in those parts, and that the animal evinces no special tenderness on putting the foot to the ground.

In shoulder slip the bulging out of the shoulder joint, when the animal walks, is indicative of the

disease. In sprain of the flexor brachii muscle, and in disease of the joint, the drag of the leg is the chief distinguishing symptom.

The flexor brachii, being a hard tendinous muscle, is apt, after being sprained, to become turned, more or less, into bone, and, consequently, to lose its power; hence the gravity of a sprain of this muscle.

Besides shoulder slip and sprain of the flexor brachii, we may have rheumatism of the muscles, and sprain of the capsular ligament, which is a most serious accident, as it may lead to the stiffening of the shoulder joint.

Shoulder slip, when taken in time and properly treated, is an injury which does not materially impair the value of the animal.

The shoulder, though often accused of being so, is very rarely the seat of lameness.

Treatment.—The cure of these affections depends entirely on its being attempted early before organic change has taken place, the treatment being rest with a high-heeled shoe on, and fomentations, followed by mild and repeated blisters, in order to determine an increased and continued supply of blood to the part for the repair of the injury. (See "General Treatment for Sprains.") After recovery from shoulder slip, the nature of the work which induced the disease should be changed.

Sprains of the Hip and Stifle.

These are rare accidents, which may be distinguished by the fact of the presence of lameness, with local heat, pain and swelling, while there is absence of the symp-

toms of disease in other parts. In elbow lameness, "when the horse is made to move, he *drops* considerably, and seems in danger of falling at every step he takes, the limb itself almost bending double when any weight is thrown upon it." (*Williams.*)

The round bone—the hip joint—is the favourite spot to which grooms ascribe disease when the horse goes lame behind, the fact being that it is hardly ever affected. On the contrary, the hock is the usual seat of lameness in the hind extremity.

Treatment.—The treatment is similar to that recommended for shoulder sprain.

Sprained Back.

The psoæ muscles, which are sprained in this accident, are those that constitute, in the ox, the under cut of the sirloin of beef, and, in the sheep, that of the saddle. Their office is to arch the back, and to flex the hip joint. They become sprained by a horse "slipping up;" by the hind legs getting caught in a fence when "crossing a country;" or even by only jumping when the animal is young and unused to the work. There is more or less paralysis of the hind legs. If the horse is quite unable to support himself behind, even when lifted up on to his feet, we may conclude that he has broken his back, an accident that is not incompatible with his possessing some sensibility in his hind quarters, with the power of moving his tail; always supposing that there has not been displacement of the fractured ends of the broken vertebra.

Treatment.—If the patient can stand moderately

well, put him in slings; but if not, then let him lie down and keep an attendant to prevent him from attempting to rise. Give three or four enemas, with intervals of a couple of hours between each, to clear out the intestinal canal, and, it may be, to soothe the inflamed parts. Give a pint of linseed oil as a drench, and proceed as directed under "General Treatment of Sprains."

CHAPTER II.

SKIN DISEASES.

MANGE—POULTRY LOUSINESS—PARASITIC RINGWORM—PRURIGO, OR NON-CONTAGIOUS MANGE—VESICULAR RINGWORM—SURFEIT—HIDE-BOUND—CRACKED HEELS—GREASE AND GRAPES—MUD FEVER—BURSATEE—WARTS.

A MINUTE description of skin diseases is not within the scope of this work, nor indeed would it, if given, be of any practical benefit to non-professional readers. The subject is one which requires months, if not years of study, and even when mastered theoretically, the student will often find himself at fault in distinguishing between the various varieties, especially when they are of some standing. The broad general treatment is well indicated in most cases, while it will suffice for all practical purposes if we classify these diseases according to the treatment which is applicable to them, and not according to scientific considerations.

Hence we may group mange and parasitic ringworm together, the former consisting of three varieties, the latter of two. We may look upon the poultry louse as a chance visitor, and not as a resident. Prurigo, humid tetter, and vesicular ringworm may come under one heading, while surfeit and hidebound may both be regarded separately. Mud fever and cracked

heels seem to differ only as to their situation, while grease and grapes may be considered as but aggravated forms of cracked heels. Bursatee and warts are clearly distinguishable from other skin diseases.

Mange

Is a contagious disease caused by the presence of a small insect, which is somewhat similar to that which produces itch in the human subject.

I am led to believe, from the experience of many careful observers, that true mange—namely, that resulting from the presence of an insect—is a very rare disease. The term, however, being a convenient designation, is often indiscriminately applied to any skin eruption which is accompanied by itching and the formation of scabs.

(The following description of these parasites is compiled principally from Mr. Fleming's *Veterinary Sanitary Science and Police.*)

These insects feed on the fluid (serum) which is contained in blisters. In order to obtain it, they bite the skin, and then inoculate the wound, thus made, with an irritating secretion—similar to that of the mosquito—which causes a small vesicle (blister) to arise.

There are three varieties of these parasites.

The *first variety* (*Dermatodectes* or *Psoroptes*) is the only kind which is found in Great Britain. They prick the skin and conceal themselves under the scabs, which form when the blisters burst and dry up. If a few

scabs be taken off, placed on a sheet of white paper, and exposed to the sun, the insects may be seen moving about by the naked eye, or by the aid of a magnifying glass of small power. They live in colonies; hence we may observe isolated mangy spots on the skin of the horse infested by them. They chiefly attack the roots of the mane and tail. The itching which their presence causes is more intense than that experienced from either of the other two varieties. When suffering from an attack, not alone the bulbs of the ordinary hair, but also those of the mane and tail become affected, so that the skin becomes bare, wrinkled, and bleeding. Owing to their comparatively stationary habits, the disease spreads slowly, and is not quickly communicated from one horse to another, in which respect it differs from the mange caused by the second variety. It is also more readily cured than the latter affection, by reason of the more superficial position of its insects. The bare, scabby skin is kept moist by a continued discharge of fluid from the vesicles. This moist condition of the scabs will serve to distinguish it from the next form.

The *second variety* (*Sarcoptes*) of the mange insect burrows in the skin. The disease usually commences about the mane, and rapidly spreads over the rest of the body, often requiring not more than a week or ten days to do so. On examining the skin in the early stage, " a multitude of small hard pimples are found, which feel to the touch as if small seeds had been sown at the roots of the hairs, and had adhered to the skin. Examining one of these points closely, there is discovered a very little scab, to which adhere two or

three hairs; this crust is readily removed with the nail, and leaves a round, denuded, red and tumid surface, about the eighth to the fifth of an inch in diameter. When the crust is detached, there is no longer a prominence except in rare cases." (*Fleming.*) Subsequently the skin becomes bare of hair, wrinkled, dry, and covered with scabs. It becomes raw and cracked from the horse rubbing himself, and from the dry skin wrinkling at those parts which are thrown into folds when the animal moves.

The scabs are dry and readily powder when rubbed between the fingers.

This disease is highly contagious, and rapidly spreads among horses which are kept together.

These parasites are very similar in appearance and mode of attack to the itch insect of man.

In the two forms of this disease which have just been described, the affected animal shows that he is much pleased when the mangy spots are scratched with the fingers.

The *third variety* (*Symbiotes*) lives on the skin of the legs, and rarely extends above the knees and hocks. The itching is much less than that caused by the two other kinds. The crusts form into large flakes. The effects of the disease are visible only during summer. It is communicated from one animal to another with difficulty.

Treatment.—The horse should be kept in a stall by himself; his clothing should be dipped into boiling water, and his harness, gear, &c., should be rubbed over with oil of turpentine, so as to destroy any of the insects which may have remained on them. The stable

fittings, &c., should be washed with soap and hot water, and then lightly brushed over with crude carbolic acid.

As "the course of the disease is slow in horses well fed and cared for, but in those under less favourable circumstances it spreads with great rapidity" (*Williams*), we should attend to the horse's general health, so as to render his skin an unsuitable habitat for these parasites. A mild dose of physic—say a pint of linseed oil—may at first be advisable, while a linseed mash may, with advantage, be given every or every second night, as linseed has an excellent effect on the skin. A drachm of tartar emetic may be mixed through the food daily for a week or ten days; after a few days' interval, an ounce of liquor arsenicalis may be given daily, in the same manner and for a like period. Both tartar emetic and arsenic have a marked beneficial effect on the skin.

As the destruction of the insect is the only radical means for removing the disease, the affected parts should be well washed with warm water and soap, in order to remove the scaly cuticle under which these parasites conceal themselves; while, after washing, one of the different mange applications should be rubbed in. In the second variety of mange (sarcoptic) the application should be freely applied over the body, on account of the roaming propensities of the insects. I have found nothing more efficacious than plain kerosene (paraffine) oil, applied once a day, and allowed to dry on the horse, if possible, in the sun. Kerosene oil is frequently used in India for this purpose, and is also recommended by M. Trasbot, Professor at Alfort.

Mr. Fleming advises—

Common oil - - - -	1 pint.
Oil of tar - - - - -	1 oz.
Sulphur - - - - -	1 oz.

"These are mixed, and allowed to stand in the sun or by a clear fire for some time, and frequently stirred."

An excellent application for mange, and indeed for any skin eruption resembling it, especially when accompanied by itching, is—

Corrosive sublimate - -	½ drachm
Prussic acid (Scheele's strength)	1 drachm
Water - - - - -	½ pint.

Prussic acid acts most beneficially in allaying irritation of the skin.

In cases of doubt as to the nature of the disease, I would advise that this preparation be tried.

If the affected parts be of limited extent, mercurial ointment is an excellent dressing. If applied extensively, it is apt to cause salivation.

A mixture of sulphur and train oil forms the common mange ointment.

As the eggs of the mange insect take several days to hatch—fourteen being the usual number stated—we should continue the applications, for the removal of these parasites, sufficiently long to ensure both their destruction and that of their eggs, which, during the period of incubation, are hidden in small galleries underneath the skin.

Poultry Lousiness.

The small insects which infest ill-kept poultry are very apt to settle on the horse, if fowl be allowed free entrance into a stable, or if they be kept close to it. These parasites cause intolerable itching of the skin; but as they can live for only two or three days away from their natural abode, removal of the poultry will constitute the only treatment actually required. The corrosive sublimate wash, given on page 60, may be tried. On board ship, during long sea voyages, I have often been attacked by these insects from having sat down inadvertently on a hen-coop.

Parasitic Ringworm

Occurs under two forms, both being due to vegetable parasites, whose presence and distinguishing appearances may be detected under the microscope. Both are characterized by an eruption which appears on the skin in circular patches of, usually, about the size of a florin, but may be considerably larger. "This form of ringworm differs from the vesicular form (herpes circinatus) by the absence of vesicles, and by the formation of scurf or scales around single hairs, or in patches surrounding several hairs." (*Williams.*) In both, the irritation may produce soreness and scabbiness of the skin.

Any one, except perhaps a highly experienced observer, will find great difficulty in distinguishing between these two forms—unless by the aid of the microscope —or even in telling the difference between them and vesicular ringworm.

Ringworm is readily communicated to horses by men suffering from it, or by other animals (cats, for example) that may be affected, and *vice versa.* Many such instances are on record.

Treatment.—The same as for mange.

Prurigo, or Non-contagious Mange.

Under the above general heading we may class various non-parasitic eruptions of the skin, which are accompanied by itching, and somewhat resemble mange in appearance. In these affections the skin has not the same bare, scabby, furrowed look it presents in true mange. There are no parasites present, while the scabs are small and thin. The disease seems to be brought on by some influence which interferes with the healthy action of the skin, such as checked perspiration; irritation from the wearing of woollen and dirty clothing; want of grooming; a heated state of the system, &c.

The root of the tail is often the chief point of attack. The mange insect usually directs its attention to the mane, and to the parts of the neck and shoulders near it; while the eruption of prurigo is much more general. It often appears on the skin, in the form of a number of small blisters, which spread rapidly, and are usually found on the soft skin of the thighs, flanks, neck, or shoulders. Prurigo, attacking the root of the tail and the parts about it, is very common during the hot weather and rains in Bengal, and especially in Calcutta; it being, in this case, due to climatic influences,

combined with the use of food of too highly heating a nature, and too little exercise. We find a somewhat similar affection among men residing in the tropics, called "prickly heat." The climate of Bengal being a very damp one, the presence of moisture in the heated air prevents the free evaporation of perspiration from the skin; besides this, in the hot weather it is difficult to procure a sufficiency of green fodder.

The irritating effect of a flannel shirt next the skin, during the hot weather in the tropics, makes itself quickly felt by the wearer who may have a tendency to "prickly heat." In fact, the simple wearing of cotton shirts next the skin will often prevent an attack of this affection, which would be inevitable were flannel shirts worn instead. As the skin of the horse is much more sensitive than our own, we will naturally admit the advisability of, in cases of prurigo and other skin diseases, never putting woollen material next the horse's skin; the wearing of a clean cotton sheet is here clearly indicated.

Owing to the similarity of the causes which affect the skins of horses, at the same season, from year to year, we often find non-contagious mange occurring once every twelve months in different animals at the same time, that being almost always summer. If it occurs in winter, it will then be due to irritation caused by dirty woollen clothing, want of grooming, or some constitutional disturbance which has checked perspiration.

The term *prurigo* is usually employed to denote a scaly inflammation of the skin, while "*humid tetter*" signifies an eruption of small vesicles (blisters), which

burst and dry up. For our present purpose there is no need for describing these affections separately.

Constitutional Treatment.—Give bran mashes and a dose of physic. Keep the horse on soft food and green meat. But if he be already on grass, substitute hay for it.

"It must also be borne in mind that all rough articles of diet, such as meal seeds, coarse straw, and other inferior and damaged stuffs, are very prone to cause skin diseases." (*Williams.*) Soak a couple of pounds of linseed in a gallon of water for five or six hours, and divide it between the daily feeds; or mix a couple of ounces of linseed oil in the horse's food two or three times a day; and in his corn or mash give a drachm and a half of tartar emetic, once a day, for a week or ten days. The use of common or rock salt should not be neglected. This treatment will generally suffice for mild cases. In more obstinate attacks, stop, after a week's time, the tartar emetic, and substitute an ounce of liquor arsenicalis. With a few days' intermission these medicines may be alternated again. If the patient be suffering from indigestion he should be specially treated for it.

The horse should be warmly clothed, and should get plenty of exercise, in order that his skin may act properly, so as to relieve the irritation. Between the woollen clothing and the skin a cotton sheet should be placed, to obviate the itching which the presence of the harsher substance would cause. While the ailment lasts, a soft rubber should be substituted for the brush and currycomb.

Local Treatment.—Dress the irritated surfaces with

(1) Kerosene (paraffine) oil, to be applied once a day.

(2)	Petroleum - -	1 part.
	Oil - - -	4 parts (Mr. Oliphant, F.R.C.V.S.).
(3)	Carbolic acid - - -	1 part,
	Glycerine or oil - - -	40 parts.
(4)	Goulard's extract - - -	1 part.
	Glycerine or oil - - -	4 parts.

or,

(5)	Corrosive sublimate - - -	$\frac{1}{2}$ drachm.
	Prussic acid (Scheele's strength)	1 oz.
	Water - - - - - -	$\frac{1}{2}$ pint.

The horse should be washed with warm water and carbolic or tar soap, well dried, and then dressed with the application. Mr. Oliphant has obtained most excellent results in India with the petroleum mixture, which should not be washed off. Its strength may be raised or lowered as the operator sees fit. Mr. Skoulding, V.S.R.H.A., recommends for use in India, vinegar one part, water five or six parts. This is a nice, clean application. If the irritated parts be of small extent, a little mercurial ointment may be used instead of the other dressings.

If the itching round the tail be due to the presence of worms in the rectum, the animal should be treated for them. When the tail is affected, a leather sheath should be adjusted on it, to prevent it from being rubbed.

Non-Contagious or Vesicular Ringworm.

This disease is almost identical with humid tetter, except as regards the form it takes. This eruption breaks out on separate portions of the skin in more or less rounded blotches. The causes are similar to those which influence the occurrence of humid tetter, while the treatment is the same in both diseases. "Should there be excoriations, an ointment of nitrate of silver, ten grains to the ounce of lard, should be used. If the eruption be associated with debility, as is commonly the case with young horses which have passed through an attack of a debilitating disease, tonics and good food are to be prescribed. Mr. Erasmus Wilson recommends that when herpes has become chronic a blister should be applied." (*Williams.*)

Surfeit

Is an eruption of small irregular lumps which break out suddenly on, generally, the horse's neck, loins, or quarters, the usual cause being acidity of the stomach, or some other disturbance of the animal's digestive organs. As the skin is continuous with the mucous membrane of the intestinal canal, a disturbance of the one structure is readily communicated to the other. These lumps, thus formed, tend to break into scabs. In some cases the hair on them scales off, "and, what is very peculiar, the hair never assumes its original colour, but remains white on the seat of the rash, the animal being ever afterwards spotted upon

those parts where the rash was situated." (*Williams.*) There is more or less itching of the skin.

Treatment.—Give a mild dose of physic and one ounce of bicarbonate of soda twice a day in the food for a few days. Keep the horse on light laxative food, and give a linseed mash every night. The bicarbonate of soda has a most soothing effect on the mucous membrane of the intestines; while the good effect of linseed in cases of irritation of the skin or mucous membrane is well marked. In obstinate cases employ tartar emetic, or liquor arsenicalis, as directed for prurigo.

Hidebound.

"What is called 'hidebound,' a condition where the skin seems to have lost pliability and softness, is a symptom of a general state of mal-nutrition, arising from indigestion, improper food, worms in the intestinal canal, or a want of proper exercise, &c. A staring coat often accompanies the above-described conditions, —very often a staring coat is the only symptom of ill-health." (*Williams.*)

Treatment.—In general the best means to bring the horse back to health, when in this state, is to keep him warmly clothed, well exercised, and to feed him on light and easily digested food; giving him, say, a linseed mash every night, and now and then a little boiled barley (2 to 3 lbs.) instead of dry corn, and a moderate supply of fresh grass and lucerne in place of a portion

of his hay. In cases of debility accompanying hide-bound the following is a capital tonic:—

Powdered cantharides	- -	5 grains.
Sulphate of iron	- - -	20 grains.

To be given twice a day in the food. The sulphate of iron improves the quality of the blood, while the cantharides has a beneficial action on the skin. Tartar emetic, as for prurigo, may, with advantage, be occasionally substituted.

If the horse is troubled with worms, or if his liver is out of order, he should be treated accordingly.

Cracked Heels

Is the term applied to an inflamed state of the skin of the back of the pasterns of the horse. It is similar to the chapped condition of the lips to which people are liable during cold weather.

Nature of the Disease.—In order to keep the skin and hair soft and pliable, there are a vast number of minute oil glands deeply embedded in the skin. Two accompany each hair, and supply it with oil by means of their respective ducts. Those parts of the skin (as that at the back of the pastern) which are subject to much bending and wrinkling are plentifully supplied with oil glands independently of the presence of hair. As this oil is obtained from the blood, it follows that, when the skin has a good supply of blood, these glands will furnish an abundant supply of oil, and *vice versa.* External cold tends to chill the skin and drive the blood away from it. Hence, if the skin of the back of

the pasterns be exposed to a cold wind, especially when the skin is bare of hair, as in the case of well-bred horses, and when the presence of damp increases the degree of cold by evaporation, the horse will be liable to an attack of cracked heels. Washing the feet and legs, after work, will increase the liability by reason of the subsequent reaction and chill. From this we may learn that, in order to avoid having this troublesome complaint in our stables, we should abstain from clipping and pulling out the hairs which grow on the pasterns of the coarser breeds, and should not wash our horses' legs and feet, particularly not with hot water; that a stiff greasy application is the best preventive measure, and that the best treatment will consist in drawing blood to the part by stimulating it, and in protecting it from cold and damp.

Symptoms.—In the affected skin small cracks appear, from which a watery discharge exudes. This discharge has not the same irritating effect as that of grease. The eruption is usually caused by the pasterns being washed, especially when warm water is used, and not being quickly and thoroughly dried afterwards; by the hair on the parts being clipped or pulled out, and by cold and wet. Horses frequently get cracked heels from going in the early mornings over ground on which the dew lies. They often, when doing hard or fast work, get this disorder from the sweat running down and drying on the pasterns, especially if there be a sharp, cold wind blowing at the time. From the nature of their work, racehorses and hunters are much more liable to get cracked heels than animals which have

not to go at a fast pace, for the skin that covers their pasterns is subject to far more violent and rapid flexion and extension; hence it will proportionately suffer from any derangement of its lubricating apparatus —the oil glands of the skin. An inflammatory state of the system is also alleged to be a cause of this complaint. It certainly has a predisposing influence.

Preventive Treatment.—As a preventive measure the feet should on no account be washed. In fact, the pricker, brush, and rubber are all that is needed to keep them clean. If the feet happen to get wet, they should be dried as quickly as possible; though, following the lesson to be learned from the preventive treatment of mud fever, we may conclude that if, during cold weather, the feet be covered with mud for a considerable time, through a day's hunting for instance, it is advisable to allow the mud to dry on the feet and then to brush it off, instead of removing it by washing while the mud is still wet. Rubbing into the heels of the horse a little fresh butter, or equal parts of oil and beeswax, half an hour before the animal leaves the stable, is most efficient in warding off an attack. As glycerine is soluble in water it should not be used.

If the water of a country over which a horse is worked contains much mineral matter (salts of lime, for instance), it is very apt to cause cracked heels as well as mud fever, even in cases where soft water would fail to do so.

Treatment.—If the skin be simply rough, fresh butter applied as just mentioned, with oxide of zinc powder or burnt alum dusted on the part a few times a day,

will generally be sufficient; or oxide of zinc ointment alone may be used. The following is a very nice application:—

Cocoa-nut oil - - - -	4 oz.
Beeswax - - - - -	4 oz.
Carbolic acid - - - -	$\frac{1}{2}$ oz.
Camphor - - - - -	$1\frac{1}{4}$ oz.

If the skin be slightly broken, the affected part should be washed twice a day with water and soap (glycerine or carbolic soap for choice), well dried, and oxide of zinc ointment or the following liniment should be rubbed in:—

Goulard's extract - - -	1 part.
Oil or cream - - - -	4 parts.

If the horse be worked, a little of the application—whichever one be used—should be applied half an hour or so before he quits his stall. If much heat or soreness be present, apply a carrot or turnip poultice. In such cases no caustic or stimulating application should be used until the inflammation subsides and the skin becomes soft and smooth, which it will do after a couple of days' poulticing. Failing carrots and turnips, a capital poultice may be made with bran wetted with hot water, and mixed with a little linseed oil to keep it soft and make it soothing to the inflamed skin; the part should then be treated with the Goulard extract and oil application. Give bran mashes and green meat, and divide a drachm and a half of tartar emetic daily in the food for a week or ten days.

It frequently happens that some horses, especially

those kept for racing, are affected with chronic cracked heels, which, apparently, heal up all right when the animal is treated and rested, but break out again immediately he resumes fast work. In such cases I have found the greatest benefit arise from blistering the skin, by the application of undiluted carbolic acid. When the cuticle peels off, the skin underneath will be found to be healthy and strong. After this, a mixture of carbolic acid and oil—1 to 6—may be used, and can be weakened or increased in strength as the case demands. The acid neutralizes the irritating discharge from the cracks, and by its blistering effects draws an increased supply of blood to the part, so that the vitality of the skin is increased in a marked manner. The principle of this treatment is in accordance with the practice of applying lunar caustic to the chapped lips of persons suffering from that ailment.

In cases where it is not convenient to throw a horse out of work for a few days, a mixture of one part of acid to two of oil may be used in preference to the acid by itself.

Grease and Grapes.

Grease is an aggravated form of cracked heels, in which vesicles form on the inflamed skin. As a result of this inflammation the function of the minute oil glands of the part, whose secretion renders the skin soft and gives a polish to the coat, is impaired, "and, as a consequence, the movements of the limb cause the skin to crack, and to become a mass of soreness, ulceration, and fungus, accompanied by heat, pain, and lameness.

When the disease is of this type it is very apt to assume a chronic character. The febrile symptoms, along with the heat, pain, and lameness, diminish; but the swelling still continues, and the skin is constantly moist and greasy from the discharge, which is thick, fœtid, and mats the hair together." (*Williams.*)

In bad cases red fungous excrescences appear on the affected part. These are commonly called *grapes*.

Grease and grapes appear to arise sometimes from constitutional causes, aggravated by neglect. If the inflamed condition of the skin in grease be not speedily reduced, the swelling of the limb will often become permanent, owing to the exudation beneath the skin becoming converted into a low form of fibrous tissue, thus producing elephantiasis. Hence the necessity of prompt and early treatment. The limb never, I may say, regains its natural condition after the appearance of grapes, which is an affection unknown in all but the worst managed stables.

Treatment.—Poultice the parts with carrots or turnips, in order to remove the irritating discharge and to soothe the inflammation. Wash the affected surface with soap and warm water, and then pour over and rub into it undiluted carbolic acid, of which the unpurified or crude form will do. A second or even a third application of the acid may be necessary at intervals of a few days. During these intervals the parts should be washed daily with soap and warm water. After that apply—

Carbolic acid - - - -	1 part.
Glycerine - - - - -	20 parts.

This will serve to soften the skin and to deodorize the part. Poultices may be employed from time to time to remove any heat and inflammation. Before exercise a little softening ointment may be rubbed in, as recommended for cracked heels. A dose of physic will generally be advisable, especially if the animal be of a full habit of body. He should also have a judicious change of food, with a linseed mash every or every second night. Tartar emetic may be used for a week, as recommended for cracked heels; while in obstinate cases an ounce of liquor arsenicalis may be given daily for a like period after that.

If grapes be present, they had best be removed in the manner described by Professor Williams:—"For this purpose two blacksmith's fire-shovels are the best instruments; one to be made sharp at its edge, and heated to a *red* heat, to remove the excrescences; the other kept cold, and placed between the skin and hot shovel, to prevent undue burning." Shovels may be specially made for this operation.

Mud Fever

Is an ailment similar to cracked heels, being inflammation of the skin of the legs, which sometimes extends to the belly, and is caused by the action of moisture and mud, and particularly by the practice of washing the legs after continued work through wet and dirt, as when hunting. There is usually a certain amount of fever present. The legs become very sore, and the horse has to be thrown by for some time.

Here, as in cracked heels, owing to the presence of inflammation, the oil glands of the skin of the parts affected fail to pour out the oil which is necessary to keep it in a soft and pliable condition.

The practice of clipping horses' legs is a strong predisposing cause of mud fever as well as of cracked heels. If, after work through mud and wet—supposing the animal's legs have neither been clipped nor singed—the legs be not washed, but be allowed to dry of their own accord, he will rarely, if ever, get mud fever. The use of warm water, as I have already remarked in the case of cracked heels, even with every precaution, is most liable to cause this affection.

"I strongly recommend the Irish method of clipping, namely, clipping all parts of the body except the legs. The hair that is left on the legs protects them from the irritation of wet and dirt." (*Williams.*)

The "hard" nature of the water of a country, by its irritating effect on the skin, predisposes horses to mud fever as well as cracked heels; hence the prevalence of these ailments in some districts in England, particularly during wet and cold seasons.

If the horse's legs have to be washed, use only cold water, quickly and thoroughly dry them with the rubber and by hand-rubbing, and put on flannel bandages. In my own stable I confine the external use of water to the animal's muzzle, eyes, dock, and sheath.

Treatment.—Treat as for cracked heels. If there be much fever present, give a mild dose of physic—a pint of linseed oil for choice.

The best preventive measure is to allow the mud

and dirt to remain on the legs till they have become thoroughly dry—say till next morning,—and then brush the dust off.

Bursatee

Is, as far as I know, peculiar to India.

It appears in the form of unhealthy sores, which break out on the surface of various parts of the body. Up to the present time nothing definite is known as to its true nature. As purely speculative theories are beyond the scope of this work, I will content myself with detailing the principal facts connected with this disease.

Its name implies—*bursat* signifying rain in Persian—that it has some connection with the rainy season.

Symptoms.—Bursatee appears in the form of hard chancre-like sores on the skin, and visible mucous membranes. The fetlock joints (especially), yard, sheath, front of the chest, face, lips, and tongue, are the favourite seats of the disease.

The sores—one or more in number—generally make their appearance towards the end of the hot weather, assume their greatest virulence through the rains, and gradually heal up on the approach of the cold weather, though in old and neglected cases they may continue, more or less, open all the year round.

Mr. F. Smith, V.S.R.H.A. (*Veterinary Journal*), states that the disease originates in the tissue immediately under the skin or mucous membrane, in the form of a small hard nodule which is painful to the touch, and is accompanied by heat and swelling; and

that, after a few days, the characteristic hard, indolent bursatee ulcer breaks out on the part.

The sore usually takes a somewhat circular form, and may vary from half an inch to nearly a foot in diameter. It bears a strong resemblance to a hard chancre. It has a hard, well-defined margin, hard base, and, at first, a dark red, unhealthy look. When situated on a part covered with muscle, as on the front of the chest, the sore may assume a yellowish white suppurating appearance. It is kept moist by the exudation of watery matter. There is but little discharge from the ulcer on to the surrounding skin.

Imbedded in the sore are found small hard particles (called *kunkur*) of a yellow or yellowish red appearance, and varying in size from that of a grain of sand to that of a small pea. They act as foreign bodies in irritating and keeping open the ulcer. They may be easily removed by the aid of a forceps, or by the finger nail.

"When the *kunkur* has once grown, unless it is completely burnt out with caustic, fresh deposits of the same kind are found under the skin all round—perhaps owing to some of the diseased matter being carried from the original centre by the absorbents.

"Many of these deposits being no larger than pins' points, it is very difficult to be sure that all are eradicated; and if any remain they will probably increase in size, and cause the sore to burst out afresh during the next hot season." (Mr. Meyrick, M.R.C.V.S., *Veterinary Journal*).

"I have seen pieces of *kunkur* the size of peas picked from the membrane inside the eyelids of colts whose eye fringes, being out of repair, did not keep off flies—

an ulcer or sore not having had time to form." (*Mr. Meyrick.*)

A dried up bursatee sore, whose appearance has not been modified by the action of caustics, &c., may be recognised from the fact of its margin and base being hard, its surface being but thinly covered; from its position; and from its peculiar, though difficult to be described, look. It seems ready to break out again at the first unfavourable change in the weather. When it does so it will probably extend to eight or ten times the size it was when dried up.

Post-mortem Appearances.—Mr. Oliphant, F.R.C.V.S., Mr. Meyrick, and other accurate observers, state that *kunkur* is found in the lungs, liver, and other internal organs of the bursatee-affected horse. Mr. Oliphant regards bursatee as somewhat of the nature of tubercle. The so-called *kunkur* which is found in the internal organs of these horses does not, however, exhibit any tendency to soften, which is one of the characteristics of tubercle.

I may mention, in passing, that Villemin (see Jones and Sieveking's *Pathological Anatomy*) caused the production, after two or three weeks, of tubercles in the lungs of animals on whom he experimented by introducing yellow, as well as grey, tubercle under the skin. Dr. Wilson Fox and Dr. Saunderson obtained the same result by simple mechanical irritation, such as that produced by the introduction of a seton under the skin.

The exciting cause of bursatee appears to be irritation due to friction, dirt, improper treatment of wounds, bites of insects, &c. Climatic influences, and probably

the want of a sufficiency of green food, aid in predisposing the animal to the attack.

Liability of certain parts to bursatee.—The liability of certain parts to contract these sores seems to be dependent on their comparative exposure to mechanical irritation, and on the thinness of the skin which covers them.

Some facts about bursatee—Bursatee is practically restricted to "the plains" in India, for though it appears, in a few rare instances, at hill stations, such cases are simply exceptions to the general rule that the disease does not originate, nor does it continue its course, in horses which are kept at elevations of 5,000 feet or upwards above the level of the sea.

It is most frequently met with in low-lying, unhealthy localities, where east winds are prevalent.

It is practically unknown among horses whose stable management and feeding are properly attended to.

Abrasions which occur during the hot weather, if neglected or wrongly treated, are liable to turn into bursatee sores. Clean cut wounds, unless, perhaps, in very exceptional cases, do not exhibit this tendency.

Horses that have had this disease are very liable to its recurrence on the spots which have been previously affected, unless, indeed, the old sores have been completely destroyed by the knife, firing iron, or some strong caustic. An intending purchaser should, therefore, view with suspicion any bald patches indicative of bursatee which may be visible on its favourite seats.

A horse which has, or has had, bursatee should be regarded as unsound.

Formerly, bursatee was very prevalent in Indian

stables, but now, owing to improved sanitary arrangements, it is comparatively rare.

It appears that bursatee cannot be communicated by inoculation.

According to the Bengal Stud Records, bursatee is not hereditary. Some observers, however, state that the contrary is the case.

During "the rains" in India, owing to a peculiar condition of the atmosphere, wounds and abrasions heal with extreme difficulty, especially when east winds are prevalent.

The lymphatic glands do not appear to become affected during an attack of bursatee.

Microscopical examination of Kunkur.—Dr. Thin, to whom specimens of *kunkur*, in the form of "small, hard reddish pieces of matter," were submitted, "could make but little of them. When a portion was examined in water, it appeared to be quite amorphous; with acetic acid it looked somewhat like a hardened cell-conglomeration, but the appearances were not sufficiently marked to justify a statement. The masses may be, and probably are, concretions of pus and epidermic cells formed by heat and dryness. No parasites or organisms of any kind could be detected." (*The Veterinary Journal.*)

Mr. Smith states that "the nodules are not formed of inspissated pus."

For an exhaustive account of the microscopical examination of these sores see Mr. Smith's articles on "*Bursatee*" in the *Veterinary Journal* for November and December, 1879.

Preventive Measures.—"In some of the late Bengal

studs, every wound, even the smallest scratch, was smeared daily with a thick mixture of sulphur and oil, upon which no flies will settle.

"I have carried out this practice for many years, and have never known a wound so treated to assume a bursatic character." (*Mr. Meyrick.*)

Flies, during the hot weather, being a source of extreme annoyance to horses, should be carefully excluded, as much as possible, from the stable by screens, and by keeping the building dark, though without, in any way, impeding the due circulation of air through it; while the stalls should be kept scrupulously clean, for the presence of dung and dirt attracts flies.

During the hot weather the horse should have a plentiful supply of green fodder; his food should consist of, at least, a third of bran; while he should get steady and regular exercise.

He should, of course, be thoroughly well groomed at least twice a day.

I am strongly opposed to the practice of washing horses, though I am not prepared to say that it induces bursatee.

Treatment.—Theory indicates, and experience proves, that the proper treatment is to destroy the sore, so as to produce a healthy wound; and then to carefully protect the part from the action of air and moisture; from friction or injury of any kind; and from the irritation due to dirt, flies, &c., lodging on it.

Camphor, by itself, and especially when combined with carbolic acid, has a powerful effect in allaying the

pain felt in sores. The acid, when used alone, has a similar though less marked effect.

Apply undiluted carbolic acid freely to the ulcer, so as to destroy it. Then keep the following mixture (phenicated camphor) constantly applied:—

Carbolic acid - - -	1 part.
Camphor - - - -	$2\frac{1}{2}$ parts.

When the wound assumes a healthy look, substitute the following application:—

Carbolic acid - - -	1 oz.
Resin - - - - -	1 oz.
Camphor - - - -	5 oz.
Spirits of wine (the methylated form will do)	15 oz.

Adopting Dr. Soulez's phenicated camphor as a basis, I have devised the foregoing preparation for sores and abrasions in tropical climates. The resin, on the spirit evaporating, leaves, over the sore, a delicate film which protects it from the injurious action of the atmosphere. The spirit is employed to dilute the acid, and to dissolve the resin and a portion of the camphor. The increased amount of camphor is, in my opinion, a most desirable acquisition.

The smell of the camphor and carbolic acid will effectually prevent flies lodging on the part.

As alternative treatment, in case the foregoing does not effect a speedy cure, I would advise, as suggested by Mr. J. Anderson, V.S.R.H.A., the constant application of

Burnt alum - - - -	1 part.
Finely powdered and sifted charcoal	2 parts.

Or

carbonate of magnesia, to be dusted on the wound so as to form a thick covering.

The horse might get, with benefit, 2 or 3 lbs. of boiled or soaked linseed daily with his food, and an ounce of liquor arsenicalis, which may be given for a week at a time, with like intervals.

If the skin be in an irritable state, give 2 oz. of bicarbonate of soda mixed in the food every day.

The internal adminstration of linseed, arsenic, and bicarbonate of soda has a marked good effect on the condition of the skin.

As bursatee sores heal quickly when the horse is sent up to "the hills," I would advise this to be done in the case of a valuable horse thus affected, and even as a preventive measure when such an animal has suffered from a previous attack.

Strict sanitary conditions and good grooming should be observed.

Warts

Are generally found on the lower part of the belly, on the lips, nostrils and eyelids, and about the sheath and penis of the horse, or udder of the mare.

The appearance and position of the wart will sufficiently indicate the proper means for its removal, whether by caustics, the knife, the scissors, tying them with silk, thread, horsehair, or by the firing-iron. The latter may be often used with advantage after the wart has been cut off. On parts requiring delicate treatment, such as the eyelids or lips, the continued and careful application of vinegar or acetic acid may be tried.

CHAPTER III.

Diseases and Injuries of the Feet.

THRUSH—CANKER—SANDCRACK—FALSE QUARTER—SPLIT HOOF—LAMINITIS OR INFLAMMATION OF THE FEET—CHRONIC LAMINITIS—SEEDY TOE—PUMICED FEET—BRITTLE FEET—INFLAMMATION OF THE CORONARY BAND—NAVICULAR DISEASE—HORN TUMOURS—TREAD—PRICKS IN SHOEING—WOUNDS OF THE SOLE AND FROG—CORNS—QUITTOR—SIDEBONES.

Thrush

Is a diseased condition of the sensitive frog, accompanied by an offensive discharge from the cleft. It may be brought on by the action of moisture, which decomposes the horny covering of the sensitive frog, and thus exposes it to irritation from foreign bodies ; or by the absence of that pressure which is essential to its health. Both of these cases may be acting at the same time. In England, where the ground is always more or less wet, the former is the usual one ; while the latter is more frequently to blame in the tropics during hot weather. In India, where the ground is hard, many horses with naturally high heels are very prone to thrush from want of pressure on the frog. Their heels, if not kept to a proper level, are apt to "wire in," while the frog becomes dry and shrivelled up. As the disease advances, fissures occur on the side of the frog, close to the heel, while a fœtid discharge exudes from

them. The foot acquires a contracted appearance; and in the event of a horse under these abnormal conditions falling lame, an ignorant or careless observer is very likely to assume the ailment to be navicular disease.

When thrush is caused by wet, the frog becomes soft and pulpy. In all cases the presence of the disease is accompanied by an offensive smell.

The action of pressure is to cause an increased supply of blood to be drawn to the part for its nutrition. Hence, when the frog is exposed to continual pressure it becomes strong and well developed; while if it be deprived of this natural stimulus it becomes diseased and shrivelled. The skin of our own hands and feet is as dependent on continued pressure for its strength and hardness, as is the frog of the horse.

Thrush is more frequently found in the hind than in the fore feet, because in badly-managed stables the dung and urine of the horse is often allowed to accumulate under him for a considerable time.

Thrush is, I think, rarely induced by constitutional causes. To prove such a case it would be necessary to show that the affected foot had been kept perfectly dry, and that its frog had been subjected to pressure for a considerable time before the attack.

As far as I can learn, the only horses which are liable to thrush, from constitutional causes, are coarse-bred animals, with a tendency to grease or swelled legs.

In the tropics, maggots are sometimes found within the cleft of the frog of a foot suffering from thrush: their presence, as might be expected, greatly aggravates the disease.

In neglected cases in hot climates, red fungoid growths often spring up from the bottom of the cleft.

Thrush is an unsoundness.

Treatment.—Keep the feet dry, and avoid "stoppings" of every kind; carefully remove with the *drawing-knife* (the peculiarly-shaped knife used by shoeing smiths) or *searcher* (a fine, small drawing-knife) any diseased or loose portions of horn, in order to prevent dirt or wet accumulating about them. Into all the parts from which either discharge or odour issues, introduce calomel or burnt alum. Above all things, obtain pressure on the frog, and keep the feet dry.

If the animal be actually lame from the thrush, give a dose of physic, and apply poultices for two or three days, in order to lessen the inflammation and to remove any offending matters, before using calomel or burnt alum.

In cases where the frog is dry and shrivelled up from want of pressure, take the shoes off and keep the heels and the wall of the hoof as low as possible, short of making the animal go actually tender, and give exercise daily on dry soft ground. A month of this treatment, together with the use of burnt alum or calomel, will generally restore the frog to a healthy condition, and to nearly, if not quite, its natural size. The ground surface of the heels and wall of the hoof is clearly delineated in Fig. 10.

If maggots be present, those within reach should be picked out, while the application of oil of turpentine or a little powdered camphor will remove any that may be left.

If red fungoid growths be seen at the bottom of the cleft of the frog, they may be treated with powdered sulphate of iron, or sulphate of zinc, which is a still more powerful astringent. In aggravated cases treat as for canker.

"In the winter-time the frog denuded of its horn occasionally becomes frostbitten, leading to deep sloughing, which may even extend to the navicular bursa, and causing great lameness." (*Williams.*) Here physic, cleanliness, poultices, and warm fomentations, followed by mild astringents, as the white lotion, alum and water, or burnt alum, are indicated.

Canker.

Canker is a constitutional disease appearing on the ground surface of the foot, in the form of pale fungus-looking growths, accompanied by a thin, fœtid, and nearly colourless discharge, which is profuse from the cleft of the frog when that part is attacked.

According to Percivall the hind are oftener involved than the fore feet, and the frog than the sole. Generally the disease is not confined to one foot. As cart-horses are usually kept under far worse sanitary conditions than are better-bred animals, and as their feet are, as a rule, much weaker and more liable to disease, we find that canker is almost peculiar to them. Owing to improved stable management it is now-a-days a rare disease.

Treatment.—As this is a most intractable disorder, I would most strongly advise a non-professional man not to attempt its cure. Very rarely can good here be

done by half-measures. For an exhaustive account of the radical treatment by stripping, I refer my readers to Professor Williams' work on Veterinary Surgery. Even in the best hands the disease demands months of trouble, and is, even then, often incurable.

Sandcrack

Is a vertical crack in the wall of the hoof, occurring in the first instance close to the coronet.

Nature of the Disease.—The fibres of the hard external layer of the wall of the hoof (see Fig. 4),

Fig. 3.

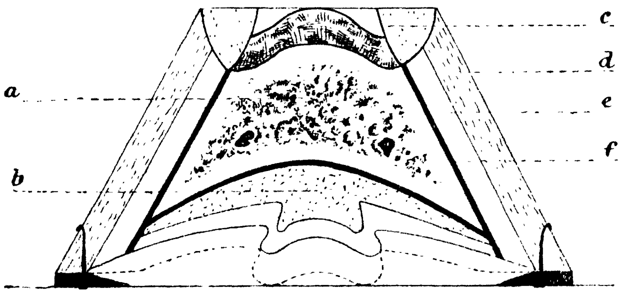


Diagram of vertical cross section of horse's foot to illustrate manner in which seated shoes obtain pressure.

Dotted lines show outline of unmutilated frog and sole.

a Pedal bone.
b Sensitive frog and sole.
c Coronet.
d Wall of hoof.
e Inner layer of soft horn.
f Sensitive laminæ.

as well as the adhesive matter which holds them together, are secreted by the coronet; while "the very tough and natural state of the wall is maintained and preserved by the continual addition to it of horny agglutinating cells, secreted by the sensitive laminæ as it (the wall) descends over the foot." (*Williams.*) Now if these conditions be prevented

through mal-nutrition—for we must remember that the process of secretion from the coronet and *sensitive laminæ* (a membrane which is thrown into a number of folds, and which secretes the inner horn of the wall of the hoof and covers the pedal bone) is constantly going on—we may have separation of the fibres of the wall, as they are then no longer held together with sufficient tenacity to bear the strain of work, especially when it is of a fast nature and on hard ground. If the pedal bone of a horse which has suffered from bad sandcrack be examined, a groove will be found in the part of it opposite to which the sandcrack lay. This is caused by the presence of inflammation having interfered with the due nutrition of the bone by the bloodvessels.

The fissure itself occurs in a moment, but the process leading up to its development is necessarily a slow one. Some horses inherit from their sires or dams weak feet, while all which are reared on wet, marshy land have feet whose horn is more porous and ready to split than is that of those brought up on dry soil. The pernicious system of using seated shoes, and of paring the frog, induces sandcrack by interfering with the healthy functions of the sensitive laminæ and coronet, in that an excessive amount of strain is thrown on the secretory organs (the coronet and the sensitive laminæ) by the unnatural manner in which the crust of the hoof is called upon to bear the whole weight of the animal, instead of it being distributed, as nature intended it to be, between the wall, the crust, and the frog. (See Fig. 5.) Fast work and hard ground aid in inducing perverted secretion. If these influences be kept up for some months, until the entire hoof or a considerable part of

it has been secreted under them, we shall have it in a condition to split, and thus to form a sandcrack at any moment, which it will naturally do at the point which receives the greatest amount of strain, that being, usually, the inner quarter of the fore, and the toe of the hind foot.

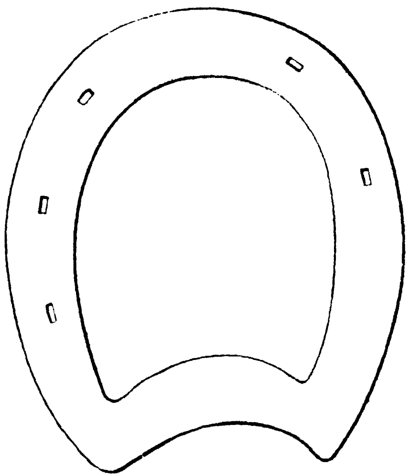
The injury first begins by a small fissure close to the coronet, and extends both upwards and downwards and works deeper as the mischief is aggravated by concussion. In time, the inflamed underlying tissues protrude through the crack, and get pinched and wounded as it opens and shuts during movement. The animal is now excessively lame, especially when the toe of the hind foot is the seat of the disease.

Mr. Broad, of Bath, was, I believe, the first to point out that the crack opens when the foot is raised from the ground, and closes when weight is put on it. This explains the great pain experienced by the animal with a bad sandcrack when he moves. On account of the greater amount of pressure thrown on the hind toe in progression, we find that sandcrack at that spot is much more serious than when at the inner quarter of the fore foot.

Treatment.—As the edges of the fissure cannot reunite, we must look to the growing down of the crack as the only cure. If its upper extremity be some little distance from the coronet, we may burn with the iron, or cut with the searcher, a line across it deep enough to prevent the crack from extending higher up. But if the fissure reaches the coronet, we must wait until it has grown down sufficiently to allow us to make this line. Another groove should be cut or burned across the

lower extremity of the crack, so as to prevent it working downwards. The crack may be opened out (bottomed) in order to prevent the lodgment of grit and dirt, and to save the sensitive parts underneath from being pinched. The coronet should be stimulated to secrete stronger horn by rubbing into it, every second day or so, cantharides ointment reduced to half its strength by the addition of lard. A bar shoe —heart-shaped if the animal be required to go beyond

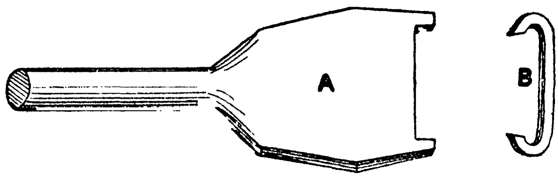
Fig. 6.



a walk (see Fig. 6)—should be applied, the sole and wall immediately below the crack being first eased off to avoid pressure. The shoe should be moderately stout, so as to lessen the effect of concussion. With sandcrack at the toe of the hind foot employ a shoe with side clips, like those used for hunting shoes. If there be no inflammation of the underlying tissues, and if the

Fig. 7.

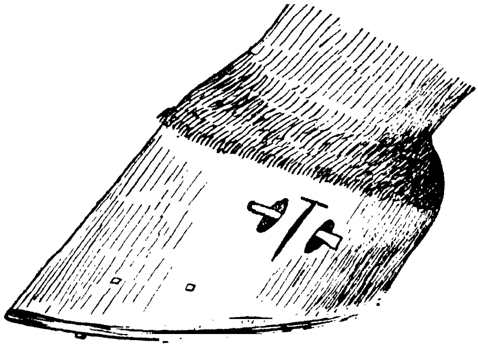
(*Half actual size.*)



mechanical means be present, a clasp should be applied. This is done by heating the points of the instrument *A* in the above sketch, and then by burning holes in the hoof with them at equal distances from, and at opposite sides, of the crack. The ends of the clasp *B* are now fitted into the holes made by *A*, and the clasp is tightened by a powerful pincers, in order to bring the edges of the fissure closely together. This is an operation which any person may do. A second method of clasping, but one requiring the aid of a skilful smith, is to cut a small groove, about a quarter of an inch deep, at each side of, and parallel to the crack, each groove being about half an inch away from it. A small, broad, flat horse-nail is now driven so as to enter at one groove and to come out at the other. The edges of the crack are brought together with the pincers; the head of the nail is cut off, and both ends are clenched.

Another method, which can easily be done at the toe, consists in drilling a hole through the horn at that part, and then using a round nail in a manner similar to the way just described. If the assistance of a good smith be procurable, the former is much the better plan, though the latter is the safer of the two.

Fig. 8.



The advantage of clasping is that it prevents the crack from extending, and saves the underlying sensitive tissues from being pinched between the edges of the crack when the foot is brought to the ground.

After this the crack should be filled with gutta-percha or some other substance, so as to exclude dirt and wet. The animal may then be put to slow work.

If the means for clasping be not available, I would advise that the edges of the fissure be opened out with the searcher, the opening filled up with gutta-percha, so that dirt or moisture may not lodge in it, and the hoof bound round with waxed twine, or with a strap, so as to prevent motion as much as possible.

The effect of binding the hoof in this manner is to keep the crack open so as to prevent it from pinching the underlying sensitive structures. Mr. South, of London, proposes a method for preventing motion by inserting into the fissure a wooden wedge which is cut level and smoothed off.

If the part be inflamed, "'bottom the crack,' and allow the escape of matter, dirt, &c.; remove the shoe, and give purgatives; order fomentations and rest. A fungous growth is generally seen filling the fissure: this is the result of the inflammation, depends upon it, and disappears upon its subsidence. It must not be destroyed by caustic, for the application will add to the irritation." (*Williams.*) When the inflammation has subsided, treat as before directed.

If the sandcrack be of a very aggravated form, penetrating deeply and causing great lameness, it is best to "strip" it. This is done by cutting with the searcher two parallel and longitudinal grooves through the wall, having the fissure between them, each groove running parallel to and being about half an inch distant from it. These grooves should penetrate right through both the outer and the inner layers of the horn of the hoof, and should extend from the coronet down to the ground surface of the wall, the depth being regulated by the appearance of blood. After the portion of horn included between these two grooves is completely isolated, its lower extremity should be detached from the sole, seized with a strong pair of pincers, and then torn right off from below upwards, leaving the sensitive laminæ completely exposed. Stripping may also be performed to a more limited extent by cutting the grooves in the form of the letter V, the apex of the detached part pointing downwards. The method I have described is the better one for very severe cases. "If any remains of the sandcrack be seen in the sensitive laminæ they are to be cut off with a sharp knife. Cold applications, bandages, and mild astringents, with rest, will con-

stitute all the after treatment necessary, time being allowed for the growth of new horn before the animal is put to work." (*Williams.*) During the operation of stripping the hoof, the horse should, of course, be cast, and should, if possible, be put under the influence of chloroform. Tincture of the terchloride of iron (tincture of steel) diluted with six parts of water, or a strong solution of alum and water, may be used to stop the bleeding.

After the cure is effected, use shoes that are perfectly flat on the foot surface, avoid "thinning" the sole, or even touching it with the knife; and obtain frog pressure, which may be done by keeping the hoof short, taking care not to interfere with the proper slope of the foot (about 50° for the fore, and 55° for the hind), and by using tolerably thin shoes.

Sandcrack is an unsoundness.

False Quarter

Is a longitudinal depression in the wall of the hoof, due to non-secretion of the horny crust by the coronet. This loss of secreting power is caused by an injury—such as tread, or quittor—which destroys the part. The horn covering this depression is solely derived from the sensitive laminæ. (See remarks on Sandcrack.)

False quarter may commence at any part of the coronet, but is most common at that from which it takes its name.

It is an unsoundness. To guard against tricks in trade, it is advisable, before buying a horse, to have his feet washed.

Treatment.—Can only be palliative. Here, as directed for sandcrack, try the effect of a blister on the coronet.

Split Hoof.

Under the above heading I wish to include those divisions of the horn of the foot which do not take the characteristic form of "sandcrack."

The chief varieties of this accident are as follows :—

1. A split of the hoof, which, as the result of concussion on hard ground, commences on the ground surface of the foot at the bottom of the groove that separates the heel, at either side, from the frog, and extends through the horn, more or less up to the coronet at the back of the pastern.

Treatment.—If there be lameness, poultice the foot for a couple of days ; open out the fissure freely with a fine drawing-knife or searcher ; lower the heels, so as to take pressure off them ; apply a heart-shaped bar shoe (Fig. 6), which will throw pressure on the frog ; and rub a little blistering ointment (cantharides 1 to 18, or biniodide of mercury 1 to 24, of lard) into that part of the coronet which is immediately above the crack, every second day or so, in order to stimulate it to secrete strong horn.

The opening out of the fissure is done to prevent the sensitive parts underneath from becoming pinched when the horse places his foot on the ground.

2. The wall of the hoof sometimes splits at its lower extremity, thus forming a sort of spurious sandcrack. In these cases, the fissure rarely extends higher up than a couple of inches.

Treat as for sandcrack.

3. A horizontal division of the horn, which,

generally commencing a little above the heels, extends in a forward and slightly upward direction. Beyond being carefully cut out it will not require any special treatment.

4. The horn at the coronet sometimes separates for a little distance and forms a deep cavity in which water and dust may lodge. Every part of the detached horn should be cut away with the drawing-knife, while the coronet above the fissure ought to be blistered as before described.

Laminitis, or Inflammation of the Feet.

We may regard laminitis under two forms, viz., acute and chronic ; and may look upon the sub-acute form as an intermediate stage between the other two.

Professor Williams divides laminitis into two kinds: first, when the inflammation is confined to the sensitive laminæ and sensitive sole; second, when the inflammation also involves the pedal bone from the outset. The former, if neglected, is apt to run into the latter and far graver form.

"If any particular shaped feet are more predisposed to it (laminitis) than others, it is the flat-soled, weak-crusted, and narrow upright feet (donkey-shaped)." (*Mr. Broad.*)

The sensitive laminæ are continuations of the true skin, and cover the outer surface of the pedal bone (see Fig. 1), at the lower margin of which they terminate, while they take their origin at the coronary band, which secretes the crust of the hoof. These laminæ consist of from five to six hundred folds, their office being to

secrete the inner and softer horn of the wall. They are plentifully supplied with nerves and bloodvessels.

ACUTE LAMINITIS is caused either by mechanical strain on the sensitive laminæ of the feet, or by inflammation extending from the mucous membrane or skin to the laminæ, all three structures being continuous one with another. When brought on in the latter manner, as a result of inflammation of the lungs, super-purgation, &c., it is said to be due to *metastasis*, or the shifting of the inflammation from one structure to another. This is not the true metastasis which we see in rheumatism, where the pain and swelling shift from one to another totally different part of the body. When arising from strain, Mr. Broad (*Bath and West of England Society's Journal* for 1869) considers that "the ordinary cause of laminitis in the horse is plethora and want of exercise, quite independent of size, whether a small pony or a heavy dray-horse. It is a question of fat and idleness." When a horse is very gross, more weight is thrown on his feet than they are intended by nature to bear; while want of exercise induces stagnation of blood in the feet, which is further augmented by the perpendicular position of the legs. Besides this, as pointed out by Mr. Broad, high feeding favours the stagnation of blood, in that it tends to diminish its fluidity by increasing the fibrine and other solid constituents contained in it.

We see the evil effects of want of exercise in inducing this disease, when horses are kept standing for many days on board ship. To lessen the danger of laminitis appearing when taking horses by sea, their

shoes should be removed, and the heels and walls of the hoofs should be rasped down so as to get frog and sole pressure.

Mr. Broad states, "I have known it to occur to fat horses which have been at grass for months without having been haltered."

Long and fast work on hard roads, especially after a period of idleness, is very apt to bring on an attack of this disease.

Acute laminitis, induced by direct strain on the parts, is much more intractable than when caused by so-called *metastasis*, while its development is greatly favoured by the pernicious system of using seated shoes, which relieve the sole from pressure and throw a double amount of work on the crust of the hoof (see Fig. 5). Added to this, if the frog be also deprived of pressure, the jar on the sensitive laminæ is greatly increased. This strain is further augmented when the hoof is kept in an unnaturally upright position by means of thick-heeled shoes, calkins, or by allowing the heels to grow too long, while the toes are kept low.

As explained by Professor Williams, there is an exudation—as a natural result of inflammation—thrown out by the bloodvessels of the sensitive laminæ, which accumulates at the toe, that being the part of the foot which is most plentifully supplied with blood. As a result of inflammation, a quantity of the fluid and colourless portion of the blood transudes into the neighbouring tissues. In laminitis, this exudation which forms at the toe, presses against the pedal bone and horny crust. As the latter structure cannot yield, the point of the former is forced down towards

the sole, sometimes, in fact, penetrating it. In accommodating itself to its new position the pedal bone gets altered in shape and structure, the toe and borders becoming absorbed, and its substance more or less honeycombed. Owing to its extremely porous and vascular nature this bone is enabled to accommodate itself to these new conditions.

Some pathologists maintain that exudation proceeds from the inflamed tissue itself, and not from the blood-vessels, instancing the fact that inflammation with exudation—as in inflammation of the cornea of the eye—occurs in non-vascular structures. This point of pathology does not concern us here.

Sometimes, but very rarely, the exudation accumulates below the pedal bone at the toe.

In slight cases of inflammation the exudation may become absorbed with little or no organic change occurring; but in graver cases it becomes further organized, breaks up, and is absorbed, there being a vacant space left between the horny crust secreted by the coronet, and the inner horn secreted by the sensitive laminæ, which cavity subsequently becomes filled with a cheesy and imperfect sort of horn—a condition which is termed "seedy-toe." The alteration in position of the pedal bone also occasions "pumiced feet" (convexity of the sole). "The sole being pressed upon by the point of the bone is forced downwards, losing its natural concave shape; whilst from the secreting powers of the sensitive sole becoming interfered with, partly arrested, or perverted, the horny sole remains weak, cheesy, or spongy." (*Williams.*) The entire sole both at the heel and toe becomes thin and weak.

The second way in which laminitis may be brought on is, as before mentioned, by *irritation of the* mucous membranes or skin extending to the sensitive laminæ; for instance, in cases of inflammation of the lungs, inflammation of the intestines, super-purgation, from irregularities in feeding or drinking, from chill, &c. As pointed out by Professor Williams, "the skin, mucous structures, and laminæ are continuous one with another, and secretory;" so that what affects one rapidly extends to the other. "The irritation of the cutaneous surface may be very slight, scarcely observable; but the irritation of its foldings in the feet, surrounded by their unyielding case [the horny crust of the foot], becomes a source of pain; in fact, it may be said that this slight sympathetic irritation becomes the cause of an acute inflammation, because located in unyielding structures."

Mr. Broad (*Bath and West of England Society's Journal* for 1869) remarks, "I have lately had two acute cases in the same stable under treatment at the same time, the result of feeding principally on straw. I have also known it on many occasions to be the effect of eating an inordinate quantity of corn (wheat especially). I may also here observe that I have understood from a friend who has been some years in the State of Illinois, in America, that the disease is there very common as a result of injudicious feeding upon maize."

As the fore-feet are far more exposed to the effects of concussion, and as they have to bear more weight than the hind ones, we generally find that they alone are implicated in an attack of laminitis.

"It is not very unusual to find all the four feet affected, sometimes the two hind feet only, and in rare instances one fore or one hind foot." (*Williams.*)

Founder is the old name by which this disease was known, and is still used by grooms.

General Ryves, referring to India, remarks in his "Veterinary Aide Mémoire" that "laminitis almost invariably attacks the fore-feet; I have never seen a case to the contrary, and believe they are rare."

Symptoms of Acute Laminitis.—The horse will endeavour to relieve the walls of the affected hoofs of pressure by, if the malady be in the fore-feet, stretching them forwards so as to throw weight on the heels, and by bringing the hind feet as much as possible under the centre of gravity of the body. But if the disease be confined to the hind feet, the animal will draw back his fore-feet under his body, and will advance the hind ones, so as to relieve the toes of the latter of pressure. The horse evinces uneasiness in the affected feet. Generally there is considerable heat present in the hoofs and coronets, and the arteries which run down the pasterns throb.

Mr. Broad, in the *Veterinarian* for April, 1877, remarks that he has sometimes observed "the temperature of the feet was not much above natural."

Tapping the foot lightly with a hammer causes pain. The horse is most averse to allowing any foot to be taken up, by doing which weight might be thrown on an affected one; he suffers great distress, especially when the hind feet are attacked; he is most unwilling to move, and at first is generally very averse to lying down. The breathing is hurried, and the lining membrane of the eyelids (the conjuctiva) is more or less

red from congestion. "The mischief is very readily and unequivocally detected by pushing the animal backwards; if he winces under this, and is still unwilling to move, it is an unerring indication of the existence of the disease." (*Dick.*) "To diagnose a case quickly, the best method is to push the animal backwards, when it will be seen at once that he will elevate his toes and throw his weight upon the heels. The pulse of laminitis is full, strong, and accelerated; and it will maintain the character of strength and fulness even after general debility has manifested itself." (*Williams.*) The pulse is fuller and harder in laminitis than in almost any other disease.

As a consequence of a severe attack, the point of the pedal bone may protrude through the sole, while the hoofs may slough off: in the latter case, if the horse survives, the hoofs will be replaced in time by others of weaker and more imperfect horn; in the former case, in the event of recovery, the protruding point of bone will drop off, while the part of it which has been brought close to the sole will become more or less absorbed. I need hardly say that the result of such complications is to most seriously diminish the animal's usefulness.

Treatment of Acute Laminitis.—This disease is treated according to two most widely different systems. The old method is that of reducing the inflammation by local and general means, and by relieving the feet of pressure by putting the patient in slings or by casting him. To Mr. Broad, of Bath, is due the credit of having devised the other method. Its chief characteristics consist in the employment of peculiarly shaped

shoes, which throw the weight that has to be borne by the affected feet as much as possible on their heels; and also in making the horse take exercise in order to relieve the congestion of the parts. Many of our best veterinary authorities are warm supporters of Mr. Broad's views on this subject. Professor Williams takes exception to giving the horse exercise, regarding, as he does, "that congestion is the result, and not the cause of the disease." As I am not competent to decide this vexed subject, I shall content myself with detailing both systems.

Mr. Broad's System of Treatment.—"My first step in the way of treatment, whether the horse is up or down, is to get tacked on two extremely stout, wide-webbed, and long bar-shoes, made from iron about twice the ordinary thickness of those of the particular animal under treatment; make them gradually thin from behind the quarters, so that the heel part of the shoes may be as wide and thin as possible, and fitted rocker fashion to allow the weight of the horse to be on that part; put them on with leather soles, using only sufficient nails to ensure their staying on for two or three days, by which time the greater part of the pain will have passed away, and then more nails can be put in if necessary. If the case be not a severe one, plain shoes, made after the same fashion, with leather will do, although I prefer the bar-shoes: if the heels of the feet are very strong and high, lower them; if not, do not cut or pare the feet in any other way. I also give at once an ordinary dose of physic; and as soon as I can possibly get the shoes on I compel the animal to walk on soft ground, if convenient; if not, on the road, or

round his box for a short time, until a little of the soreness passes off. If the animal is so lame that he cannot be made to move without a person following with a whip, I order that to be done, knowing that, however much he may require it at first (cruel as it may seem), he will not want it more than two or three days, as the lameness decreases rapidly. In severe acute cases, if the exercise appear to distress the animal very much, continue it only about twenty minutes or half an hour at first, allowing an interval of from one to two hours before repeating it, after which it may be gradually increased, as the more he takes the sooner will the lameness be removed. Repeat the physic every third or fourth day (depending in a measure on the effects of the previous dose, although I never saw any ill effects from the repeated physicking in such cases), until the lameness is removed and the horse fit to work; do not then, from mistaken kindness, allow the animal to be turned to grass, or into a loose box for a month's idleness, but order him to be worked or exercised daily, otherwise there will be a liability to a recurrence, as it takes some considerable time for the vessels to recover their tonicity; it will also be necessary to continue for some time, in a modified form, the same principle of shoeing. Whenever I have a case near home I endeavour to get it away to my own stables, otherwise there is a danger of the instructions not being fully carried out. To this treatment I should have recourse even if I knew that the horse had done a hundred-mile journey the day before. In cases arising from metastasis it is necessary to be careful as regards the physicking. Before acquiring my present mode of

treatment I had tried general and local bleeding, frog setons, hot and cold fomentations, hot and cold foot-bath, with and without slings; I have also kept the animal down with the hobbles on, and used poultices of various sorts, with a variety of other modes of treatment, without any satisfactory result. Under my present system the only question is of being called in before any great alteration of structure has taken place." (*Bath and West of England Society's Journal*, 1869.)

Respecting the necessity of exercise, especially in cases resulting from fat and idleness, Mr. Broad further remarks, "In the case of horses thus affected, the vessels quickly acquire their original tonicity and proper dimensions as soon as the strain, arising from determination of blood, is diminished by *exercise;* convalescence is then speedy, and restoration of the part complete."

"If from neglect or improper treatment suppuration at the coronet has commenced, or the pedal bone is so far displaced that there is danger of its toe protruding through the sole, or if it is already through, keep the special shoes on, dress daily with hot tar until the opening in the sole has been filled up, and a particle of horny matter thrown out and become dry; after which, as soon as the horse can walk, get him into the wettest pasture that can be found, and if he is not excessively lame, take his shoes off, rasp the heels low, and shorten the toes, so as to bring the sole in contact with the ground. This operation is to be repeated every three or four weeks, which will in time ensure sound and perfect feet as before the attack occurred, notwithstand-

ing that all four of the pedal bones may have protruded through the soles; but it may require from six to twelve months before a new wall has grown down perfect, and the sensitive laminæ recovered their normal exudative powers. If the feet are not properly and regularly attended to they will not recover their natural shape, but will be deformed, especially at the toes. A wet pasture is essential, as the horn will grow as much in one month as it would in three months on dry ground.

"Should the horse be suitable for farm work, he may be used on soft land for months before he is fit for fast road work." (Remarks of Mr. Broad in Professor Williams' *Veterinary Surgery.*)

The other System of Treatment for Acute Laminitis.—(I have adapted the following from Professor Williams' work on Veterinary Surgery, and also from his lectures.) On no account give a strong purgative, especially not aloes, as we should avoid irritating the mucous membrane of the intestines. Give a pint of linseed oil, and assist the effect with an enema or two of warm water (100° F.). If there be already purgation, or if the dung be covered with mucus—a condition which indicates irritation—give no aperient. If diarrhœa be present do not give astringents, as the purging is but an effort of nature to remove the cause of irritation. Remove the shoes and rasp the wall level with the sole, so as to allow the latter structure and the frog to bear weight. On no account pare the sole. Give the horse plenty of water to drink, and put him on laxative food. If the pain be very excessive give two

ounces of tincture of opium, but do not do so if its use can be dispensed with, because we want to keep up a laxative and non-inflammatory state of the mucous membrane of the bowels. In any case give two ounces of the bicarbonate of soda twice a day in the food, and if the fever be high, with a quick, full, and hard pulse, give the following drench :—

Fleming's tincture of aconite	- 10 drops.
Water - - - - - -	- 1 pint.

This may be repeated once or twice with intervals of three or four hours, as indicated by the pulse. The soda has a most soothing effect on the mucous membrane, while the aconite is a sedative to the heart. "For the fever of laminitis I know nothing which proves so effectual as the tincture of aconite, in small but repeated doses." (*Williams.*) If there be great heat in the feet and throbbing of the arteries which run down the pasterns, bleed from the coronet at three or four points, by puncturing it obliquely with a lancet or penknife. Do not bleed from the toe, for doing so will expose the inflamed parts to the action of the air, and suppuration with the formation of matter (pus) may be the result. By bleeding from the coronet we obtain a local effect without weakening the whole system, as would be the case were the jugular vein opened. Keep the feet for a considerable time in a tub of warm water, and apply poultices for a few days. Allow the horse to lie down as much as possible; if he will not do so of his own accord, throw him gently; the advisability of this is shown by the pulse, after the horse

is down, always falling in a most marked manner. After a few days, when convalescence sets in, use Mr. Broad's shoes.

Moderate exercise should be given in cases which arise from idleness and continued standing.

I have never seen a case in which Mr. Broad's system has been fully carried out, but I can answer for the excellent results afforded by the one advocated by Professor Williams.

When the hind feet are affected the horse often cannot stale, owing to the excessive pain the act of stretching himself out would cause him; in these cases the urine should be drawn off by the catheter two or three times a day.

Chronic Laminitis.

"Chronic laminitis is that condition of the feet remaining after the subsidence of the febrile symptoms; or it may originate independently of an acute attack. Horses suffering from the chronic form are, however, subject to the acute from the most trivial causes; and the acute form, when caused by concussion, if the animal outlives the primary attack, commonly degenerates into the chronic." (*Williams.*)

"Acute laminitis is not very often met with, because horsemen are aware of the risks they run, and take their measures accordingly; but the chronic

form is common enough, and hundreds of horses are more or less lame from this cause." (*Stonehenge.*)

The horse owner's attention may well be directed to this not uncommon disease, as it is both serious in its nature and insidious in its approach.

In cases of chronic laminitis the horse goes short, throws the weight on the heels, and consequently walks with a more or less straight knee, in a sort of a "fair heel and toe" manner—the action being very different from that due to navicular disease, which causes the horse to "dig his toes into the ground," and consequently to wear away his shoes in front. There will usually be some heat present in the affected foot or feet, especially after work. The peculiar position assumed by the horse when standing in the stable, trying as he does to throw the weight on the heels, is generally characteristic. There is more or less alteration in the shape of the feet, which usually become flatter, and their soles less concave than what is natural. Feet thus affected are, as a rule, distinguished by rings of horn which run irregularly, but close together, round the foot. The rings of a healthy hoof, as remarked by Professor Williams, are regular, and have wider interspaces than have those suffering from the disease in question. Sometimes horse dealers rasp the rings brought on by this ailment neatly away. A horse suffering from chronic laminitis does not work sounder when he "warms up," as he does when affected by navicular disease.

"Seedy-toe" frequently accompanies chronic laminitis.

Treatment.—In chronic laminitis, or in cases having a tendency to it, the sole and frog should be allowed to remain untouched by the drawing-knife, while the wall should be kept well rasped down; and shoes which have the foot surface flat should be used, so as to put pressure on the sole as well as on the crust. Leather, placed between the wall and the shoe, by diminishing the effect of concussion, is often of service, though its presence will somewhat affect the hold of the nails. Pressure on the frog, which is the natural buffer of the foot, is most essential. In bad cases use Mr. Broad's shoes, but if the animal be but little affected, an ordinary or heart-shaped bar shoe (see Fig. 6) will be sufficient, while the heels may be somewhat lowered; for although this will throw an increased strain on the suspensory ligaments and back tendons, it will materially lessen the jar on the sensitive laminæ—the lesser of the two evils. A little cantharides ointment, reduced to half its strength, may be rubbed into the coronet every second day or so, in order to stimulate it to secrete stronger horn. After work, if there be any heat present, the horse should be made to stand with his affected feet in warm water for some time. In the stable, tan will make a cool bedding for him to stand on. If that be not procurable, he should have plenty of straw placed under him, and have the stall darkened so as to induce him to lie down as much as possible. Above all things he should not be worked on hard ground, nor with a heavy weight on his back. With horses which are averse to lying down, slings might be employed, being fixed just high enough to allow the animal to rest on them if he chooses, with-

out the webbing pressing on his abdomen when he stands up. Charlier shoes in some cases might be used, provided the wall of the crust be strong.

Appearance of a Foot which has suffered from Laminitis.—It will usually have a largely developed frog; low heels; thin and flat or even convex sole; weak, brittle horn; often a concave profile when viewed sideways: frequently there are rings on the external horn, which run irregularly around it, and meet close together in front; while "seedy-toe" is often present. An unusually large frog, flat sole, and brittle horn are very characteristic signs.

Seedy-Toe

Is the term applied to a cavity between the wall of the hoof and the inner layer of softer horn, caused by their separation; and is usually a result of laminitis (see remarks on that disease), though it may also be due to some mechanical arrangement, by which more strain has been thrown on the wall than it was intended to bear, as when seated shoes are used. The excessive strain in such cases induces a mal-secretion of horn from the sensitive laminæ, which horn is deficient in its natural gluey properties, by which, in a state of health, it was enabled to adhere firmly to the wall, hence the separation, which is usually of a limited extent when unconnected with laminitis. However, I have seen a very extensive case of seedy-toe brought on by a bad system of shoeing, seated shoes, soles pared out, heels allowed to grow long, &c., and by the habit the mare had contracted of never lying down.

Mr. Percivall mentions pressure of the clip of the shoe as the chief source of this ailment.

The separation of horn is not limited to the toe alone, but extends often to the quarters and high up towards the coronet. The existence of seedy-toe is readily seen on removing the shoes. Sometimes the wall at the centre of the toe cracks, making a vertical fissure. There is frequently a depression a little below the centre of the front part of the hoof when viewed in profile. If the part of the wall which covers the cavity be tapped, it will emit a hollow sound.

When seedy-toe is not complicated by the presence of laminitis it hardly ever causes lameness, unless it be very extensive.

Treatment.—Carefully remove with the searcher every particle of detached horn, until all appearance of a crack is gone, and the line of union between the wall and the inner layer of horn is seen smooth and undivided. Apply a bar shoe. Rub into the coronet, every second day or so, a little of the cantharides blistering ointment, reduced to half its strength by the addition of lard, in order to stimulate the part to secrete sound and strong horn. Apply on the newly exposed surface some of the following ointment every day, to protect it from moisture :—

Lard or suet - - - -	1 lb.
Venice turpentine - - -	1 ,,
Beeswax - - - - -	$\frac{1}{4}$,,

As the horn grows down, look out for the appearance of any separation between the two layers of horn ; if

such be perceived, carefully pare it out. Keep the feet dry.

For further reference see remarks on laminitis.

Pumiced Feet

Is a term by which we designate a flat or convex condition of the sole, which is generally due to the descent of the pedal bone, as a result of laminitis—see remarks on that disease,—and sometimes to the effects of work on hard ground when seated shoes (see Fig. 5), are used, without any symptoms of laminitis having been apparent.

The unnatural pressure of the pedal bone interferes with the secretion of the horny sole, which accordingly becomes weak and thin.

Treatment.—In order to support the sole and to stimulate the sensitive parts of the foot to healthy action, gradually accustom it to the use of a flat, broad shoe, which at first may be thin only at the heels, but as the foot becomes strong use one of uniform thickness, keeping frog pressure in view. Apply to the coronet blistering ointment in the manner recommended for "seedy-toe," and avoid work on hard ground.

Brittle Feet.

Use broad flat shoes, which will reduce the jar on the crust by throwing pressure on the sole ; and obtain frog pressure. The shoes should be fitted on hot—in India and in other Eastern countries the custom is tc

fit them on cold,—as by doing so they remain firmer on, owing to the more exact juxtaposition of the horn and iron. Clips should be used to save the nails from being shaken; while for the same reason calkins should be discarded. Rather fine nails should be employed, as coarse ones are apt to chip away the crust. As recommended by the late Mr. W. Thacker, V.S., many years ago, the nail holes should be punched well away from the outer edge of the shoe, so that the nails may take a good hold without having to be driven high up, which would be apt to start a chip off the crust. Keep the feet dry. Stimulate the coronet as advised for "seedy-toe."

Indigestion is not an unfrequent cause of brittle feet, for as this complaint causes irritation to the mucous membrane of the stomach and intestines, irritation is also set up in the sensitive laminæ which secrete the horn of the foot; these membranes, the skin, and the mucous membranes being continuous one with another, and consisting of the same material (epithelium) though in different forms, possess the property of transmitting inflammation from one part to another of their surfaces with great readiness. When irritation and consequent inflammation exist in a secreting structure its powers are impaired; hence the cases of weak and brittle horn secreted during attacks of indigestion. Appropriate treatment would consist in giving the animal 1½ oz. of bicarbonate of soda, which is a sedative to the mucous membranes, daily in his food, which might include, with advantage, 3 lbs. of linseed and plenty of green meat.

Inflammation of the Coronary Band, or Villitis,

Is characterized by heat and swelling of the coronet, accompanied by more or less scaling off of the horny skin round the lower margin of the coronet where it meets the wall of the hoof. As the presence of inflammation in a part interferes with its function, the horn secreted during the continuance of this disease is weak, dry, and of diminished amount. There is "a peculiar striated or striped appearance of the crust, well described by Haycock in his essay on 'Villitis.' The peculiarity of gait is due to the animal trying to glide his feet along the ground. The duration of this form of lameness is variable, but it generally lasts a few weeks." (*Williams.*) I have met with a few well-marked cases of chronic villitis. They showed but very slight lameness when coming fresh out of the stable, but "worked," lamer and lamer.

Work on hard ground is the usual cause.

Treatment.—Remove the shoe. Give a dose of linseed oil, and keep the animal on green food and bran mashes. Apply warm fomentations and poultices. When all heat has subsided stimulate the coronet as directed for "seedy-toe," and shoe so as to obtain frog and sole pressure.

Navicular Disease.

To Professor Williams is due the credit of being the first to demonstrate the true nature of this disease;

which is, primarily, inflammation of the navicular bone, or of the cartilage upon its lower surface. The inflammation extends to the synovial membrane, which lies between the navicular bone and the perforans tendon, and finally attacks this latter structure, the result usually being that the tendon becomes adherent to the bone, while the structure of the bone itself becomes diseased and weak.

On referring to Fig 1 we shall see that the perforans tendon is attached to the base of the pedal bone, and passes behind the navicular bone, which forms a pulley for it. On leaving the navicular bone this tendon passes behind the pastern, fetlock joint, suspensory ligament, the knee, and is finally united to the muscle (flexor pedis perforans) by whose contraction the foot is flexed.

A horse affected with navicular disease is said, in stable parlance, to be "groggy."

Causes.—Formerly this affection was almost always put down to contraction, but "contraction of the hoof is not a cause, but an effect of disease." (*Williams.*) Professor Dick supported the theory that sprain of that portion of the perforans tendon which passes over the navicular bone was its usual cause. To this Professor Williams pertinently replies, "If navicular disease were due to sprain and laceration of the tendon, how is it that it so rarely affects the hind feet?"—a remark, I venture to submit, which might with equal propriety be applied to every other alleged cause except that of concussion; for concussion or jar during work falls far more heavily on the fore than on the hind feet. Were the practice of using high heels or calkins to blame, or

were it even a predisposing cause to a very moderate extent, we certainly should have many more cases of navicular disease in the hind feet than the one or two isolated ones that are met with in many thousands, especially as horses are usually shod higher behind than they are in front. Besides, a horse suffering from this complaint "goes on the toe," which he would hardly do if the disease had been brought on by identically the very same course of action—raising the heel from the ground—by which he now strives to relieve the inflamed parts from pressure; which I naturally conclude to be his object for progressing in that manner. Again, a horse with navicular disease almost always goes better in a high-heeled shoe than in a low-heeled one; the reason for this being that the former relieves the navicular bone of some pressure by relaxing the perforans tendon a little, and also, I think, by removing the navicular bone somewhat away from the pressure of the coronary bone; for the more the toe of the coffin-bone is depressed—or the heel raised, which is the same thing—the straighter, or even the more *convex*, not the more *concave*, will the anterior aspect of the line formed by the pedal and pastern bones become. In fact, raising the heel tends to flex the joints of the foot and pastern.

Animals suffering from this disease should not be used for stud purposes, for the effects of hereditary predisposition are well marked in it.

Irregular exercise, especially if it be of a violent nature and on hard ground, naturally favours the development of this disease, for the parts, following a well-known law in animal economy, being thrown out

of work during the periods of inaction, are less able to bear any unusual strain than they would have been had they been kept in healthy exercise. As observed by Stonehenge, feet with naturally high heels are more prone to this disease than are flat open ones; for the latter conformation affords constant pressure on the frog, which keeps it, and the structures that it protects, in a healthy state and always prepared for work.

Navicular disease may in some rare instances be caused by stones, nails, &c., being picked up by the foot.

Owing to the greater jar experienced by the feet of cab and other horses used for quick road work, we find this disease more rife among them than among race-horses and hunters, whose tendons and ligaments are the chief structures that suffer, or even among cart-horses. As Stonehenge justly remarks, "many tolerably confirmed cases of navicular disease may, therefore, be hunted, except when the ground is hard,—supposing, of course, that they are kept off the road; but no plan of management will enable them to bear the jars incidental to harness-work or hacking."

The following remarks, which were made on this disease as far back as the year 1838 by Mr. Stewart, V.S., in his "Stable Economy," appear to me to be singularly correct and well worthy of attention:—"Long journeys, at a fast pace, will make almost any horse groggy. Bad shoeing and want of stable care both help, but I am nearly sure they *alone* never produce grogginess. The horse must go far and fast; if his feet be neglected, or shoeing bad, a slower pace and a shorter distance will do the mischief; but I believe

there is nothing in the world will make a horse groggy except driving him far enough, and fast enough, to alter the synovial secretion of the navicular joint. Cart-horses are quite exempt; horses working in the omnibuses about Glasgow, always on the stones, and often at ten miles an hour, but never more than a mile without stopping, are nearly exempt. The horses most liable are those which work long and fast stages."

The only thing I would take exception to, in the foregoing extract, is the remark which implies that the disease takes its origin in the synovial membrane of the joint; this, however, is a point of comparatively little importance with respect to the prevention of the malady.

Symptoms.—By actual examination of the foot the ordinary observer will discover little as to the nature of the ailment, though he may guess at its existence from the absence of signs of other diseases; while the peculiarity of the animal's gait, and the manner in which he "points," will tend to confirm his supposition. There is often contraction of the affected foot or feet.

When standing at ease, a sound horse almost always rests one hind leg, though, on odd occasions, he may rest a fore one; this is done, however, in an attitude which betrays no tenderness.

As a rule, the horse in this disease "points" by placing his toe on the ground, raising his heel, and rounding his fetlock joint and pastern in a peculiar manner.

The horse generally, unless the case be bad, walks sound, though when trotted he goes very "short," "daisy cuts," and "digs his toes into the ground;"

the result of this latter habit being, especially if only one foot is affected, that the toe of the shoe or shoes gets worn in a very marked manner. Mr. Percivall remarks that in trying to save the heel the animal turns the toe in.

Travelling over hard ground affects him very much, particularly with a weight on his back; while probably he will be able to go free and well through plough or on other soft "going." He is usually a bad stumbler on account of being afraid to raise his feet high, and to throw pressure on his heels. The lameness wears off to a great extent during exercise, which of course affords only temporary relief.

The disease is generally insidious in its approach, there being often nothing to mark it further than that the horse commences the habit of "pointing" in the stable, begins to go a little short, or becomes slightly lame now and then. The owner should not be misled by the lameness working off, but should endeavour to nip the mischief in the bud, for it will prove incurable if allowed to get beyond the first stages.

Treatment.—Remove the shoes, and if necessary rasp down the crust and heels so as to obtain frog pressure. The Charlier system of shoeing might be tried with great advantage. Give a dose of physic and keep on green food. Bleed from the toe or coronet. If there be a running stream at hand, make the horse stand in it for a couple of hours two or three times a day; care being taken that the part of the bed of the stream on which he stands is soft, and that he has soft ground to walk upon, both going from and returning to his stable. Tan is, I think, the best material for his bedding, as it

will tend to keep the feet cool. He should be put in a darkened stall by himself, so as to encourage him to lie down as much as possible. Horses that are affected by this disease usually lie down a good deal. Poultices should be kept to the affected foot or feet. If a stream be not of ready access, buckets full of cold water should be used. After a fortnight, as recommended by Professor Williams, apply to the coronet a mild blister, such as—

Biniodide of mercury - - -	$\frac{1}{2}$ drachm.
Lard - - - - - -	1 oz.

If after this the animal still continues lame, insert a frog seton, which may be kept in for three weeks. The ends should be tied, so that the horse may not tread on them. A high-heeled shoe should be put on in order to relieve the part of pressure, and to keep the wound out of the way of dirt. The wound should be washed every day with warm water and kept clean. An application of 1 of turpentine to 3 of oil will keep flies away. After the seton is removed, the wound made by it should be examined, so that vent may be given to any matter which may have formed. The accompanying sketch will show the direction the needle should take.

Palliative Treatment.—In confirmed cases use shoes having toes similar to those of the Thacker shoe, which are turned up so that no toe-clips are required, while the foot surface of the shoe bears on the sole as well as on the crust; and have the heels thickened. With this form of shoe, the concussion caused by the horse striking his toe into the ground will be diminished, as much as possible, by the shock being distributed over the broad rounded surface of the toe of the shoe.

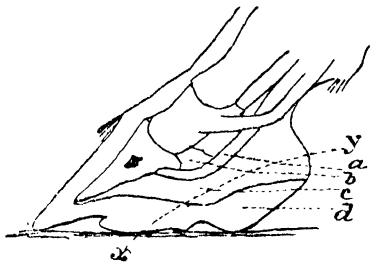
Turning the horse out into a damp grass run for some time will often do good.

After everything else has failed neurotomy may be performed.

Fig. 9.

SECTION OF FOOT.

To show position of Seton.



a. Perforans tendon.
b. Navicular bone.
x. y. Course of seton.
c. Sensitive frog.
d. Horny frog.

Horn Tumours.

Owing to the pressure of the clips of the shoes, blows, or other causes, tumours form in the inner layer of the horn of the hoof (see Fig. 5); they are sometimes "the result of long-standing corns." (*Armatage.*) As the pressure exerted by their presence interferes with the nutrition of the portion of the pedal bone opposite to where they are situated, an excavation is formed in that bone, which thus accommodates itself to the tumour. This affection is not always accompanied by lameness. "Generally a kind of fissure is seen in the outer shell of the wall, or a concavity or depression

without any actual fissure." (*Williams.*) Relieving the part of pressure by judicious shoeing is the only safe treatment.

Tread

Is the term applied to a wound inflicted upon the coronet of one foot by the shoe of the other fore or hind foot, as the case may be. The usual causes are weakness, fatigue, over-taxation of strength, and carelessness in turning the animal, especially when he is in heavy draught. This injury is principally confined to cart-horses.

Treatment.—If the wound be slight, apply a little tincture of myrrh or arnica. The spirit on evaporating will leave a thin resinous coating which will effectually exclude the air. Arnica stimulates the capillaries of the skin to absorb any effusion, and is therefore very useful in bruises. If the tread be severe, remove all loose ends, bathe the part with warm water and apply the white lotion, alum and water, or some other astringent. If the wound begins to suppurate, poultice for a day or so, but do not continue the applications too long, as they would then tend to destroy the vitality of the structures. If, after this, the sore does not assume a healthy appearance, apply a fly blister round its edges to stimulate the part to healthy action; the blister may be repeated. A neglected tread is very apt to run into quittor.

Pricks in Shoeing

Are caused by nails actually penetrating the sensitive parts, or by their being driven too "close." In the latter case the horse often does not go lame for a fortnight or more after it has occurred. I have frequently remarked in India that in such instances the nail has been driven during dry weather, and that lameness did not occur until the subsequent appearance of rain, by which the horse's feet got wet and absorbed moisture.

The injury done by " drawn nails " is generally more serious and always more difficult of treatment than when the offending nail has been left in.

Treatment.—The seat of the lameness may be detected by pinching round the crust with a pair of pincers, one side being against the sole within the inner edge of the shoe, while the other presses against the wall of the hoof; or by tapping the wall lightly with a hammer. When removing the shoe, the nail or nails which are near the suspected spot should be examined, and if one be found to be wet, thereby indicating the formation of matter, that particular nail may be deemed to be the cause of the lameness. If any doubt exists the sole should be pared, while if we then find a stain round a nail-hole on the foot surface of the horn, at the point where the animal evinces tenderness, we may assume that we have discovered the seat of the injury.

The puncture should always be " bottomed," for if this be not done, a quittor will be the very probable result, owing to the matter, which forms, not being

able to find vent in any other manner. The usual way of bottoming is to pare out the puncture with a fine searcher from the sole surface, taking care to cut away from the sensitive parts so as to avoid injuring them, for if they bleed, it will be nearly impossible to follow up the course which the nail took.

When the point of the offending nail has come out through the wall, I much prefer cutting from the outside, straight down on the passage which it has made, with a fine searcher, to excavating it from the ground surface; for by the former way there is a minimum of horn removed, the risk of getting too close to the sensitive structures is avoided, while the injured part itself is left exposed for the free application of fomentations, poultices, &c., conditions which are not obtained by the employment of the latter method. If we are quite certain of the nail before removing the shoe, it is best to cut down on it before drawing it; but if the shoe be already off, a piece of wire or a thin nail might be passed through the hole to act as a guide.

After the fissure has been "bottomed," apply warm fomentations and poultices; do not cauterize the inflamed sensitive tissues that may bulge out into the cavity excavated, "as the supposed fungus is nothing more than the swollen tissues, which disappear when the irritation has subsided, like any other inflammatory swelling." (*Williams.*) If, however, they remain sluggish after all inflammation has gone down, they should be touched with some caustic.

If there be any fever present, give a physic ball and keep the animal on laxative food.

Fracture of the Pedal Bone.—In some cases the nail

actually chips off a splinter from the edge of the pedal bone, which accident causes great inflammation and high fever. The existence of fracture may be inferred from the fact that the pain and fever, which in ordinary cases of pricked foot subside as soon as matter (pus) is allowed to come away, increase in intensity. The presence of the piece of detached bone may be known by the fœtid odour of the discharge, which will tinge a silver probe black, this colour being due to the formation of the sulphide of silver. The splinter must be cut down upon and removed without delay. If the fever be very high, give the following drench once or twice with an interval of a couple of hours :—

Fleming's tincture of aconite - -	10 drops.
Water - - - - - -	1 pint.

A quick, full, and hard pulse will indicate the use of aconite, which is a sedative to the heart. If the pain be excessive give 2 ounces of tincture of opium instead.

Wounds of the Sole and Frog

Are occasioned by nails, pieces of broken glass, stumps of bushes, &c.

It often happens that when the offending substance has wounded the foot by penetrating the cleft of the frog, an inexperienced observer will imagine that the tendons or ligaments have been strained, on account of the inflammation extending up the leg. This swelling requires no treatment, as it will subside as the inflammation in the foot abates.

The navicular bone sometimes becomes fractured by puncture. In this case there will be a discharge of synovia tinged with blood, which subsequently will become dark and fœtid. Recovery to a state of soundness, after this accident, is hopeless.

Treatment.—Remove the foreign body; open out the part so as to allow of the escape of matter. Poultice and treat as directed under "Pricks in Shoeing." Remove the shoe.

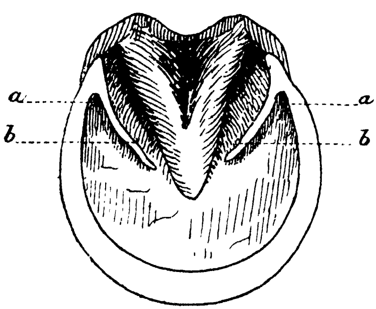
Preventive Measures.—On no account thin the sole or pare the frog, but allow the foot to retain its natural protection. Do not use "stoppings," which will make the sole and frog soft and spongy.

Corns

Are bruises of the sole, generally found at the angle between the bars and the crust just in front of the inside heel of the fore-foot (see Fig. 10). This spot,

Fig. 10.

VIEW OF THE GROUND SURFACE OF THE HOOF.



a Seat of Corn. | *b* The Bars.

within the junction of the crust and bars, is called "the seat of corn." At first the bruise is indicated by a stain due to extravasated blood, and may be readily detected on thinning the sole, with the drawing-knife, immediately over the seat of the mischief. If the corn be neglected, suppuration will take place, with the probable result of quittor. Corns are almost always confined to the fore-feet, which are far more exposed to concussion than are the hind.

Causes.—The almost invariable cause is pressure of the shoe on the "seat of corn." In some rare cases it is brought on by the animal treading on a stone or other hard body.

Preventive Measures.—Use narrow-heeled shoes, which are broad at the toes and taper gradually to the heels, so that, at the "seat of corn," they may rest on the wall only, while to the front of that part they may bear on the sole as well as on the crust. Or, if ordinary broad-heeled shoes be used, ease off the "seat of corn" with the knife before putting them on. Keep the feet dry, and do not use "stoppings," as the moisture would soften the sole and render it liable to injury.

Treatment.—Remove the shoe. If there be inflammation, apply poultices. If matter has formed, give it vent by paring, and then poultice the part. If there be no suppuration, do not remove any horn beyond keeping the "seat of corn" level with the crust, but allow the bruise to grow down, for it is simply a result of inflammation, and no good can be obtained by removing it. On the contrary, paring out the "seat of corn" to remove this extravasated blood deprives the sensitive

parts beneath of their natural protection, and thus renders them liable to injury. Put on a three-quarter shoe, viz., one cut off just in front of the "seat of corn," so that no weight may fall on it.

In bad suppurating corns we sometimes find that the pedal bone is implicated. This is indicated by the stinking odour of the discharge from the sore. The part should be opened out, and any detached portion of bone removed. After that apply poultices (see remarks on splintered bone from "Pricks in Shoeing"). If the corn does not then readily heal, pass a red-hot iron into it and freely burn the diseased parts.

A corn is an unsoundness.

Quittor

Is a fistula upon the coronet—akin to whitlow in the human subject—which tends to work down between the wall of the hoof and the sensitive parts of the foot. "It comes in the form of a hard conical tumour, hot and tender on pressure; indeed, sometimes so painful as to occasion considerable lameness." (*Percivall.*) Usually it suppurates slowly.

Quittors are principally confined to cart-horses, and are generally caused by "treads," and less frequently by neglected corns, pricks in shoeing, and other wounds which occasion inflammation in the sensitive parts of the foot. The result of such injuries is that matter, when formed, being unable to find vent downwards, works gradually up to the coronet, and laterally round the sensitive laminæ.

Owing to wounds inflicted by the sharp calkins that are used during frosty weather, this disease is most common at that period of the year.

The cure of a quittor is, as a rule, a very tedious affair, which will generally occupy two or three months at least.

Treatment.—Remove the shoe, and if necessary pare the sole to discover if the quittor has been caused by a wound on that part. If such has been the case, make an opening from below, so as to allow of the downward escape of matter. If we find the tumour before it suppurates, apply a fly blister, in order to stimulate it to healthy action. But if it is already discharging matter, poultice it with carrots, turnips, or bread, so as to relieve the inflammation, and then blister. These means, and the injection of a solution of corrosive sublimate 1 drachm, water 1 ounce, with a few drops of hydrochloric acid to dissolve the salt of mercury, will usually be sufficient to effect a cure. When a poultice is employed, a piece of thin muslin should be placed under it to prevent any of its contents getting into the wound. If there be no depending opening, and if such simple measures as blisters, poultices, and the injection fail, we may open out the sinus freely with the drawing-knife or searcher, thereby exposing it, and getting a dependent orifice for the escape of matter. We may then boldly burn the diseased parts by passing the firing iron at a red heat over them. When the slough comes off, a healthy wound will be left, which will soon heal. This is the only effective and humane way of treating a bad quittor.

In neglected quittors we often find that the pedal bone

or lateral cartilages become diseased. In such cases we may have to "strip" the portion of horn which covers the sinus (see description of "stripping," under "Sandcrack"), and to destroy the diseased parts with the red hot iron.

Sidebones or Ossification of the Lateral Cartilages.

The lateral cartilages are elastic continuations of the wings of the pedal bone. They are placed above the heels; their office being, as pointed out by Professor Williams, to restore by their elasticity the position of the soft structures immediately above the heels when the horse raises his foot from the ground.

Sidebones are generally met with in the fore-feet, and rarely affect any but cart-horses.

I think I may say that the majority of heavy cart-horses, in large towns in England and Scotland, are affected with this ailment.

This disease is due to concussion, assisted by the practice of using high-heeled shoes, which deprives the feet of the services of its natural buffer, the frog; and to hereditary predisposition.

Sidebones in aged cart-horses, that go sound and well, are of little consequence, especially when confined to the hind feet. The case with a saddle or harness horse is very different. They are, however, in all cases legally an unsoundness.

The ossified cartilages may be readily detected by

pressing the coronet, just above the heels, with the fingers; the cartilages, naturally soft and yielding, will, when ossified, be hard and inelastic.

Symptoms.—There will be a hard swelling at the back of the coronet and heels, with heat and tenderness if in the early stage; later on, the part becomes hard and callous. If lame, the horse goes on the toe and short, thus somewhat simulating the symptoms of navicular disease, but here one can easily decide the case from the state of the parts. Sometimes the cartilage of one side only is affected; the animal will then "dish" the leg either outwards or inwards, as the case may be, so as to relieve the affected side. In a case of sidebones the horse never walks with a free, elastic step.

Treatment.—Use a bar shoe so as to get pressure on the frog. Foment the part. Stop work. Blister or fire so as to hasten the process of ossification, on the completion of which the inflammation will cease.

CHAPTER IV.

Diseases of Bone.

SPLINTS—SORE SHINS—RINGBONE—BONE AND OCCULT SPAVIN—OSTEOPOROSIS OR BIGHEAD.

Splints

Are bony deposits which usually appear on the upper and inner third of the cannon and splint bones of the fore-leg.

Solleysell, followed by Percivall and Williams, divided splints into five classes, viz. :—

1st. The simple splint, which is away from the knee, and does not interfere with the tendons and suspensory ligament. This is not an unsoundness, provided that it neither causes lameness nor interferes with the action of the other leg.

2nd. The double or pegged splint, "occurs when there are two splints, one upon the outer, the other upon the inner side of the leg, directly opposite to one another, as though they were *pinned* together through the leg, from which they derive the denomination of

pegged." (*Compleat Horseman.*) The existence of this bony communication, on the back of the cannon bone, may always be inferred from the fact of the presence of the two deposits just described. This pegged splint is *one* bony deposit, not two, and of necessity can hardly fail to interfere with the action of the suspensory ligament.

3rd.. The splint close to the knee.

4th. "Two splints joined at the ends, one above the other;" or, as more correctly described by Professor Williams, "two or more exostoses upon one side of the leg, one above the other, with perhaps an osseous communication." This form shows considerable weakness of the bone, and almost always causes lameness, especially when the two splints are united by a bony ridge.

5th. A bony deposit involving the metacarpal bones (the cannon and splint bones) with those of the knee, with which they articulate. This bony union or anchylosis usually occurs between the head of the internal splint bone, and the lower surface of the small bone—the trapezoid—of the knee with which it forms a joint.

The fact that splints occur more frequently on the inside than on the outside of the leg, may be readily understood if we glance at the anatomical construction of the bones of the fore extremity; for we shall find that the internal articulating cavities on the os suffraginis and os coronæ (long and short pastern bones) are larger, and are consequently intended to bear more weight than the external ones, while the internal splint bone is thicker and often longer than the external.

These facts prove that more weight is thrown on the inside than on the outside of the leg, and consequently the former rather than the latter suffers from the effects of concussion, while nature, to equalize matters, strengthens by a bony deposit the part on which the shock falls heaviest.

Young horses (five years old and under) are most liable to splints, for their bones are more vascular than at a more advanced age, when the elements of nutrition are supplied to the bones by the blood-vessels in a proportionately decreased amount. We may also justly conclude that the younger the horse, the greater probability there is of his becoming lame from a splint.

Quick trotting work, especially on hard ground and under heavy weights, is the usual cause of splints. The influence of hereditary predisposition is well marked, while the formation of the legs themselves induces liability to this disease, especially when the animal is heavily "topped." I think I may say that, as a rule, under-bred horses, and those reared in damp climates and on succulent food, owing to the more porous and more vascular nature of their bones, are more liable to splints—supposing that they be put to quick work—than are better-bred animals, and those that are brought up under hardier conditions.

A splint on the outside of the leg causes generally much greater lameness than one on the inside. The lameness occasioned by a recently-formed splint is in no way proportional to the size of the splint itself, for often small splints cause extreme lameness, while sometimes large ones occasion little or no incon-

venience. In the former case, the lameness is probably due to inflammation deeply seated in the bone; while in the latter, the increased action may be almost entirely confined to the periosteum (the covering membrane of the bone), which "grows as the tumour grows, and so accommodates itself to the increased superficies it has to spread over, without suffering any tension." (*Percivall.*) In the one case, we may conceive that previous violent concussion has set up inflammation in the substance of the bone itself, which, being of a hard and unyielding nature, does not allow expansion of the blood-vessels that line the minute canals (Haversian canals) which ramify through the bony tissue, acute pain being the natural result of this constriction. In the other case, that the process is an effort of nature to strengthen a part which was not originally strong enough to perform the work demanded of it; the strengthening process taking place on the surface of the bone by means of the periosteum, while the internal substance of the bone remains unaffected. An exaggerated form of inflammation in the substance of the bone may occur from the effects of violent concussion, when instead of a splint being formed, the effusion, failing to get vent, is deposited in the substance of the bone, thus preventing that part from receiving nutrition by blocking up its canals, the result being that death of the affected portion of bone ensues. Respecting the structure and nutrition of bone—a subject demanding some study—I must refer my readers to one of the standard works on Physiology—that by Carpenter, for instance.

A splint which interferes neither with the knee joint

nor with any tendon or ligament, causes lameness only during its period of formation.

In the majority of cases, splints occasion little lameness, and are of trifling consequence as far as the usefulness of the horse is concerned.

Symptoms.—"A splint is detected by grasping with the hand the horse's suspected leg in the ordinary manner in which we *feel* the leg, and tracing, with the fingers upon one side and the thumb upon the other, the inner and outer splint bones from their heads downwards to their tapering extremities. Any actual exostosis will at once arrest the hand; any rising or irregularity will create suspicion and lead to closer examination." (*Percivall.*) On the other hand, as remarked by Professor Williams, "the lameness may precede the appearance of any swelling or deposit, and in such a case it is apt to be confounded with that arising from other diseases." He further teaches that on this account, in the examination of a case of obscure lameness, especially if the animal be young, one should never fail to look out for the signs of splint-lameness, namely, that the lameness at the trot is out of all proportion greater than that at the walk; that the animal usually fails to bend the knee freely, and that exercise increases the lameness. The latter condition is also present with corns, but an examination of the foot will readily determine their existence. Young horses with obscure splints causing lameness are often suspected of having navicular disease, and get rejected accordingly. Respecting this, one should recollect—1st, that the lameness of the latter affection wears off as the animal becomes warm with exercise; and 2ndly, that

horses five years old and under, very rarely indeed are troubled with navicular disease.

If the swelling causing the lameness be perceptible, there will be heat and pain on pressure.

Treatment.—If the newly-formed splint does not produce lameness it should be left alone, and if possible the horse should be kept on laxative food of a diminished amount, and his exercise restricted to light work at a walking pace on soft ground, until the splint is fully formed, and all inflammation has left the part.

If the lameness be slight give a purgative, allow very little exercise, apply hot fomentations, and give a long rest; but if this be not sufficient, rub in a little biniodide of mercury ointment (1 to 30 parts of lard) every second day or so, in order to hasten the process of formation. When the splint is of the fifth order, *i.e.*, involving the bones of the shin with those of the knee, stimulate the part with the biniodide of mercury, so that considerable irritation may be produced; this will hasten the process of anchylosis (stiffening of the joint by bony union). If the lameness be very great, perform periosteotomy without delay, and cut boldly and deeply into the new growth, so that the inflammation may be relieved by the bleeding from the congested vessels within the bone, as well as by division of the stretched periosteum. I need hardly say that this operation should never, owing to the danger of producing open joint, be performed in the vicinity of the knee. After periosteotomy, a seton should always be passed over the divided structures, the needle should enter the aperture which is already made in the skin, and may come out a little higher up than where the point of the

knife penetrated. In order to obviate the chance of a blemish, the seton should on no account be allowed to remain in longer than a fortnight.

Periosteotomy "is performed by making a transverse incision with the rowelling scissors, immediately below the enlargement, introducing the periosteotomy knife flatwise under the skin as far as the upper end of the splint, turning the cutting edge inwards to the bone, and cutting through the periosteum into the new formation. It may be necessary to cast the horse, but, as a rule, the application of the twitch keeps him quiet enough." (*Williams.*)

When a splint interferes with the action of the opposite fore-leg, it may be carefully dissected down upon, and removed with the bone forceps or gouge.

Sore Shins

In their fully-developed state may be said to consist of bony formations on the lower third of the cannon bones. The deposit is usually on the front of the bone, hence the name. The disease being due to concussion, it is almost always confined to the fore-legs, although I have seen, in the case of a young race-horse, all four legs implicated; in fact, after the growth had formed, the cannon bones of the fore, as well as those of the hind extremities, presented a distinctly bowed appearance on their anterior surfaces. Like splints, sore shins are far more common among young horses than among older animals (this being due to the greater vascularity of their bones); but, unlike the

former, they are confined almost entirely to race-horses, because in the gallop the heel is brought to the ground at a moment that the cannon bone is somewhat extended; and as the shock is transmitted vertically upwards from the heel, its effects will be felt at the lower part of the cannon bone, *i.e.*, at the seat of sore shins. In the trot the heel meets the ground when the cannon bone is in a much more upright position than it assumes in the gallop—in fact the foot comes, as nearly as possible, flat down; hence trotters seldom suffer from sore shins, although they are subject to splints.

Sore shins is a most serious disease, in some cases even involving the life of the animal.

Symptoms.—The first symptom, generally perceived, is that the horse begins to go a little "short" in his gallop, especially if the ground be at all hard, although he may act as well as ever through "dirt." On being pulled up after a strong gallop, he may be found to walk very sore and tender, although hot fomentations and a rest for a day or two may apparently set him right. All that is required to develop the symptoms is to put him to fast work again without loss of time, and probably after the next gallop he will be found to be hardly able to hobble along at a walk. Above and in front of the fetlock joint or joints, as the case may be, there will be a swelling which will be elastic and fluctuating at first, then dropsical, will "pit" on pressure, and finally will become hard; the case being, as explained by Professor Williams, that originally the swelling was due to thickening of the periosteum and to the presence of an exudation beneath

that membrane; secondly, that effusion took place into the cellular tissue which lies beneath the skin; and thirdly, that the exudation beneath the periosteum became organized into bone. During the first or acute stage, the swelling will be painful to the touch; the horse will be lame and go very "short;" there will be more or less fever; and the animal will keep shifting his feet if both be affected, or point the toe and flex the fetlock joint if one only be implicated.

Treatment.—From the foregoing remarks it will be seen that the disease should be combated on its very first onset, when a dose of physic, hot fomentations and a long rest will generally complete the cure. After a week, or when the pain and heat have subsided, the hot fomentations may be succeeded by cold applications. If after another fortnight or three weeks the swelling still continues, the part may be stimulated by a blister of the biniodide of mercury, 1 to 16 of lard. In the first instance the shoes should be removed, a purgative given, and the horse kept on laxative food. If the fever at the outset of the attack be great, as would be indicated by a quick, full and *hard* pulse, the following drench may be given:—

Fleming's tincture of aconite -	10 drops.
Water - - - - - -	1 pint.

This may be repeated once or twice.

N.B.—Never use aconite if at all uncertain about the nature of the pulse.

Instead of aconite, a couple of ounces of tincture of opium may be given, if the pain seems to be much in excess of the fever.

During the acute stage, if the swelling be very extensive and the pain great, periosteotomy must be performed without loss of time, in order to admit of the escape of the exudation, which, by the pressure it exerts on the inelastic and highly sensitive periosteum, is the cause of the intense pain and fever. Besides this, if the exudation be very great, and it be allowed to remain between the surface of the bone and the periosteum, death of the bone (necrosis) may ensue later on; the process being that this exudation, becoming consequently converted into bone, will block up the small canals through which the bone receives nourishment by means of small blood-vessels proceeding from the periosteum. Before operating, one should carefully feel for the position of the extensor tendons, which run down the front of the cannon bone, so that these important structures be not injured. The skin should then be pinched up, and the incision made well away from where the subcutaneous opening into the periosteum is to be effected. If the skin is very tense, make the incision through it with a sharp bistoury, and then use a blunt-pointed one. In all cases be particular to make the incision into the skin as small as practicable, in order to prevent entrance of air into the wound as much as possible. Before this operation is performed, the knives and hands of the operator should be washed in a solution of carbolic acid and water (1 to 40), and a similar solution should be freely used over the wound so as to prevent the entrance of putrefactive germs. After the incision is made, dress the wound with carbolic acid and oil (1 to 20).

In mild attacks of this disease periosteotomy should

never be performed. An ordinary case will yield to a purgative and hot fomentations, followed, later on, by applications of cold water and a blister.

"In some rare cases the exudate becomes converted into a thin, sanious (bloody) matter, which corrodes the surrounding tissues, causing great febrile disturbance, and the death of the patient from its absorption into the general circulation." (*Williams.*) When this condition is perceived, periosteotomy should be performed without loss of time.

The manner in which exudations are formed is explained in Chapter I.

After a case of sore shins, a rest for at least six months should be allowed, and then, when the horse is put again to work he should be exercised only on soft ground, so that there may be a minimum of the original cause of the disease, namely, concussion. I need hardly say that at first the work should be confined to walking, trotting, and slow cantering. When the horse is put to a faster pace the gallops should be short, and, if need be, repeated, with half an hour or so of walking exercise allowed between, so that the bones of the legs may be saved from long-continued jar. The advisability of warm fomentations after a gallop will naturally suggest itself to the trainer.

An attack of sore shins, in which the exudation has been extensive, will give a more or less rounded appearance to the front part of the cannon bone when viewed in profile.

Ringbone

Is a bony deposit, the result of inflammation, which forms on the upper and lower pastern bones and the pedal bone (see Fig. 1). It is of three kinds, viz.:— 1. False ringbone, which may be regarded as a splint on the upper pastern bone, situated on one or on both sides of it; in some cases it extends to the front of the bone. It is of little consequence, as it does not affect the joint, and is not to be regarded as an unsoundness unless it causes lameness. 2. High ringbone, when the deposit involves the joint between the upper and lower pastern bones. 3. Low ringbone, when the bony formation affects the lower pastern and pedal bones. The latter is by far the most serious kind, owing to the unyielding nature of the horny wall of the hoof which surrounds the affected joint. The second variety is the most common, and may be readily seen in the form of a swelling in front of the pastern on looking at it in profile.

These bony deposits are usually confined to the front and sides of the bones, and have a tendency to surround those parts. If they extend to the rear of the joints, they cause most intractable lameness. Ringbones, especially the false kind, are generally confined to cart-horses. In the fore-feet they are most probably due to concussion; in the hind, according to Professor Williams, to sprain of the capsular and lateral ligaments of the pastern joint. They are more common on the fore than on the hind feet.

I saw in Edinburgh an instructive case of lameness

from ringbone, which had been induced by the horse "going on his toe," owing to a previously existing spavin.

In the early stages of ringbone, a horse becomes lame before any deposit is formed or any swelling takes place, for here the cause of the pain is inflammation in the structure of the bone itself. When lame from this cause in the fore-foot, the horse goes on the heel; when in the hind, the toe comes first to the ground. "From this peculiarity in putting the foot to the ground it is apt to be confounded with laminitis, seedy toe, and inflammation of the coronary band. It differs from laminitis by the absence of pain at the toe, freedom from fever, &c., and by the heat being confined to the upper part of the foot only.

"An examination of the foot will determine whether there be a seedy toe or a sand-crack in its front, and the absence of the striated appearance of the wall of the foot will distinguish it from inflammation of the coronary substance." (*Williams.*) Writing about ringbones the same author remarks:—"When at the sides they do not cause the same degree of lameness as when the front is involved."

As in spavin, so is hereditary predisposition in ringbone well marked.

Ringbone must not be confounded with sidebone, which is ossification of the lateral cartilages of the foot.

Treatment.—First give rest to the parts by using, if the horse goes on his heel, Mr. Broad's shoe (described under laminitis). If on the toe, employ a high-heeled shoe. Apply warm fomentations to reduce the pain,

and afterwards fly blisters to hasten the bony union of the affected joint.

Bone and Occult Spavin.

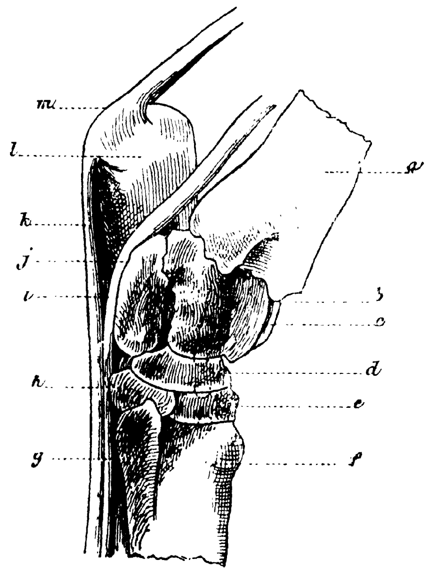
Anatomy.—In the hock (see Fig. 11) we have the true hock joint, formed by the astragalus and tibia, which serves for the bending of the leg; while to diminish the effects of concussion there are two bones—the cuneiform medium and magnum—placed, one over the other, between the cannon bone and astragalus. Following Percivall, we may call these two cuneiform bones the upper and lower cushion bones. Thus we have four joints, viz., the true hock joint formed by the tibia and astragalus; that between the latter and upper cushion bone; the one between the two cushion bones; and the joint formed by the lower cushion bone and the cannon bone.

In bone spavin, as a result of inflammation, there is a deposition of bone on the inner and lower part of the hock, commencing usually between the lower cushion bone and the cannon bone, or between the two cushion bones. The higher this bony formation extends, the more serious is the disease. When the spavin is low down, being simply confined to the joint between the lower cushion and the cannon bone, it is of little consequence, as bony union of that joint does not affect the horse's action to any appreciable extent.

Mr. Percivall very justly lays a good deal of stress on the fact that horses should not be condemned indiscriminately on account of having a so-called low spavin,

Fig. 11.

DIAGRAM OF INTERNAL ASPECT OF THE BONES OF THE HOCK, WITH FLEXOR TENDONS.



a Tibia.
b True hock joint.
c Astragalus.
d Cuneiform magnum.
e Cuneiform medium.
f Cannon bone.
g Internal splint bone.
h Cuneiform parvum.
i Perforans tendon.
j Tarsal groove.
k Perforatus tendon.
l Os calcis.
m Point of the hock.
Dotted circles mark sites of Spavin.

which, he contends, is a veritable splint in many cases, having no connection with the cushion bones. "Nothing is more common than to meet with horses—colts even—who have what the dealers call 'knots' in their spavin places; and the time was when such 'knots'—which have always been regarded as spavins—were certificated as constituting unsoundness. This was professional decision which met with a good deal of opposition at the time, and justly so, and the result has been that such 'knots' are now allowed to pass as compatible with soundness."

I believe that a splint, having the appearance of a low spavin, rarely occurs on the head of the cannon bone without involving the lower cushion bone also; although union of these bones frequently takes place without the action of the animal being affected in any perceptible manner, as there is very little motion indeed in that joint. The lower cushion bone at the seat of spavin has a naturally well-marked bony ridge on its surface, which gives it the appearance of having a small splint. The reader may satisfy himself on this point if he takes the trouble of examining this bone in the dead subject.

The more to the front of the hock the bony deposit is situated, the greater danger is there of it giving rise to lameness, for during exertion, when the hocks are bent, there is great pressure on the bones to the front of the joint, while the bones to the rear have comparatively little weight thrown on them.

The lameness of spavin in horses six years old and under is usually curable, but not that of old horses (see remarks on occult spavin).

Coarse hocks need not be viewed with suspicion if both be exactly similar and there be no lameness.

"If a spavin causes actual lameness, or makes the horse come stiff out of the stable, or when starting, especially if such a spavin be high up and near the joint, such a horse must be said to be unsound." (*Lascelles.*)

If an "aged" horse has coarse hocks and goes sound, there is little probability of his becoming lame in them.

Young horses often have enlarged hocks, which fine down as they grow older.

In naturally coarse hocks the cushion bones are large, hence their shape is the one best adapted for diminishing concussion.

The usual causes of spavin are concussion and sprain of the hock, the latter being brought on by jumping, "putting the horse on his haunches" in military riding, &c.

Hunters are liable to spavin, as the stress, when leaping, is thrown particularly on the hocks. For this reason good hocks are indispensable in the cross-country animal, and also for racehorses when they are required to go up a hill. Mr. Percivall remarks, "We do not so frequently observe spavin in racehorses and horses that have lengthy, blood-like quarters; neither are 'sickle-hocks' nor 'cow-hocks' thereto disposed: this may arise from their experiencing less concussion than hocks of another description." The obvious reason that racehorses do not so often suffer is that with them the weight of the rider is thrown forward, while they are not "collected" in the same manner as

the hunter or charger; besides this, they are usually ridden in a snaffle.

Horses are said to have *sickle-hocks* when these joints are unusually bent. With a *straight dropped hind-leg*, the limb, when fully extended, is almost straight from the stifle to the fetlock. When the points of the hocks are turned inwards, the term *cow-hocks* is used to denote the peculiarity of shape.

In cart-horses, high calkins induce spavin, on account of their causing the weight to be more directly thrown on the cushion bones and the head of the cannon bone, than is done when the heels are low; this is especially the case when the animal is going downhill with a weight behind him.

Horses "*tied in*" *below the hock* are naturally subject to spavin. The tying in consists of the cushion bones and the head of the cannon bone being small, a conformation that presents a diminished surface over which concussion has to be distributed. It gives the hock a short and weak appearance.

Hereditary predisposition is well marked in spavin; on this account, if practicable, mares and stallions suffering from it should not be employed for breeding purposes.

Occult Spavin is the term used to signify that condition of the hock in which no external evidence of disease can be observed, although the lameness due to pain in the part may be of a most inveterate form. We have here ulceration of the articulating surfaces, *i.e.*, ulceration of the surfaces of the bones which form the joints. In health, the bones of a joint never touch, as they are always separated by articular

cartilage. In ordinary bone spavin, this cartilage becomes ulcerated as the result of inflammation extending from the bones, and is finally absorbed, while the exudation thrown out from the bones is converted into a bony material, which causes long union and stiffening of the joint. Here we have a reparative process with cessation of inflammation. Now in occult spavin, the process stops short at ulceration, and no reparative action takes place at all; hence the very serious and intractable nature of this form of the disease. Occult spavin is naturally much more common in old, than in comparatively young horses, as in the latter the materials of repair are much more abundant than in the former. As the inflammation, and not the deposit, constitutes the disease, we must regard bone and occult spavin as one and the same complaint.

Symptoms.—The lameness of spavin is characterized by want of freedom in bending the hock—which causes the horse to go on his toe and wear the shoe at that part—and by the lameness getting better as the horse "warms up" at exercise. In severe cases, and especially in occult spavin, the lameness "consists in a sort of spasmodic catching up of the spavined limb the moment the heel of the foot comes down upon the ground, something after the manner of stringhalt." (*Percivall.*) Sometimes the stiffness can only be observed when the animal is pushed over from one side to the other in his stall. A spavin may often be detected when riding a horse down a steep hill, from the fact of his "dragging the toe." "The time of all others when a spavined horse will be apt to manifest

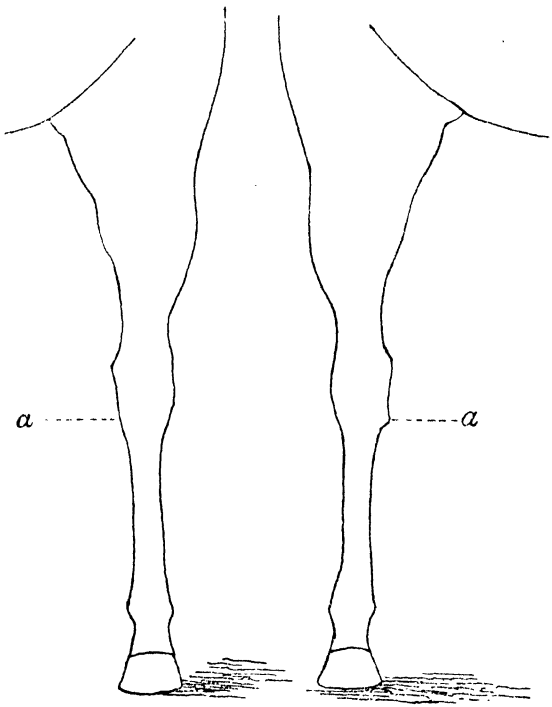
his lameness will be the day following after a hard day's work; and when he makes his first egress from the stable in the morning is the critical period for examination." (*Percivall.*) Therefore we should be prepared to form our judgments quickly in these cases, for the longer the animal is trotted up and down before us, the sounder will he generally become. At the end of each trot past he should be turned a different way; I mean first to the left about, then to the right about, so that one may see on which hind leg he turns best. If there still be a doubt, the foot of the suspected leg may be taken in the hand, drawn upwards and held, so that the hock may be kept bent for a minute or two, and then the foot may be let down, when, if disease be really present, lameness will become very apparent, if, after that, the horse be trotted.

We may have the visible sign of spavin—swelling at the part—without lameness at all. If there be heat and tenderness on pressure, lameness will be almost certain to be present. For detecting the bony formation, a careful comparison of both hocks by the eye is, as a rule, the safest guide, when, if they are found to be exactly similar and no trace of lameness present, the horse may be passed as all right. Each hock should be viewed while the observer stands close to the side of their respective fore-legs, and should see if there be the slightest difference between the two hocks, or prominence on the site of spavin of either. "Now it is precisely the interval between the prominence of the hock ceasing and the cannon beginning—the part of the superficial line which constitutes the *dip* from one into the other—that is *the site of spavin;* a small

Fig. 12.

FRONT VIEW OF NEAR-HOCK FREE FROM SPAVIN.

FRONT VIEW OF OFF-HOCK SUFFERING FROM SPAVIN.



a......Site of Spavin.

round tumour interrupts the natural declivity from the hock to the cannon, and in a moment catches the eye of the experienced observer. In cases where the tumour, from its smallness or flatness, or diffuse character, is indistinct to the eye, the examiner will not make his mind up concerning it until he has narrowly compared the suspected with the sound or normal hock." (*Percivall.*) See Fig. 12.

The examiner should satisfy himself by feeling both hocks, the near with the right, the off with the left hand. A more correct impression is conveyed by a light and moderately rapid touch, when running the hand down, than by dwelling longer and pressing too hard.

The existence of a spavin in the form of a small point of bone, towards the front of the joint, often causes severe lameness, and is difficult, if not impossible, to be detected without feeling the hock with the hand.

It may not be out of place to notice here a symptom of incurable lameness of the hock joint owing to rheumatic disease, namely, a crackling sound emitted by the joint, and accompanied by pain "the moment the patient commences to move about, particularly in the morning after the repose of the night." (*Williams.*)

When a horse is chronically lame from spavin, the muscles of the affected limb tend to waste away considerably from inaction. In severe lameness of the hind extremities, the animal evinces great disinclination to lie down, and his condition suffers accordingly.

Treatment.—In the very early stages of this lameness, with or without heat and swelling at the site of the spavin, we should endeavour to subdue the

inflammation before any structural change takes place; the best means being the employment of a high-heeled shoe to throw the part into rest, the administration of a dose of physic (aloes), the application of hot fomentations, and rest. If there be much pain, keep the part smeared over, during the intervals between the fomentations, with the following anodyne mixture:

Extract of belladonna	- - -	2 parts.
Camphor	- - - - - -	1 part.

Gum sufficient to make it adhere.

If after the acute symptoms have subsided, we find the true hock joint to be involved, we may regard the case as hopeless; but if the cannon and cushion bones only be implicated, we may look to the removal of the lameness (when the inflammation has ceased) with the completion of the union of the affected bones. Our object, therefore, should be to encourage this process by using setons, blisters, or firing; not regarding them as counter-irritants, according to the old and mistaken idea, but as agents for still further increasing the already existing inflammation, in order to hasten the process of union. These irritants excite an increased supply of blood to the part to furnish materials for the new formation of bone that is going on. It is good practice, in the early stages after rest, physic, and hot fomentations have failed, to pass a seton under the skin in a vertical direction, entering a couple of inches above the prominence, and coming out an inch or so below it.

The incision through the skin may be made with a rowelling scissors. A blunt-pointed seton needle should be employed.

Some blistering ointment may be smeared over the tape before introducing it. The horse need not always be cast; a twitch, and holding up the corresponding fore-leg, being all that is usually needed. The part may after that be blistered with the fly ointment. If the muscles of the quarter of that side be at all wasted, they also may be blistered, but lest irritation of the urinary organs may ensue from the absorption of the cantharides, the surface blistered should be limited, say to the size of one's hand. Give the horse a mild dose of physic and keep him on laxative diet. The seton should not be allowed to remain longer in than ten days or a fortnight, so as to avoid the chance of a blemish. After this the animal should be kept quiet in a loose box for a month, or until all inflammatory symptoms have subsided. If this treatment does not succeed, fire the part deeply. The method I would prefer is to fire deeply through the skin down on to the deposit at three or four different points, as the case may require, with a blunt iron rod about an eighth of an inch in diameter, heated to redness. This is most effectual, and will leave little or no blemish. Or the part may be fired deeply in the usual manner by drawing horizontal lines about half an inch apart. Firing with the ordinary iron for spavin should, if possible, be done to the horse standing, as then the lines can be drawn straighter than when he is on the ground. The lines may be altogether omitted on the front of the joint, or, if drawn, they should be made very light and horizontal, so that they may not crack when the animal resumes work.

A high-heeled shoe is indicated in spavin lameness.

Osteo-porosis or Big-head

Is a porous condition of bone, which is brought on by some cause affecting the proper nutrition of the bones. It is, as we might have expected, essentially a disease of youth, which is the period of development. "In no instance have I heard or seen it affecting horses above six years old; frequently, indeed, the animals have ranged from two up to four years old." (*Williams.*) It attacks all classes of horses, and is, usually, supposed to be peculiar to horses and geldings. I have met with, in Eastern Bengal, three cases of it among mares. It is called *big-head* in America.

I have known a case of recovery in which the pony got gradually well without any special treatment, except that it was given corn for the first time in its life. The head permanently presented the characteristic appearance caused by the disease, while the resulting alteration in the nasal passages made the animal a confirmed "roarer."

Mr. Woods, F.R.C.V.S., in an article on "Osteo-porosis in Mines," writes as follows in *The Veterinary Journal* for August, 1879:—"Several slight cases, which were at once brought out of the pits, recovered. They were put in loose boxes at the farm, and treated with a mild laxative (linseed oil), followed by mineral tonics and chlorate of potass dissolved in the drinking water. Mashes and grass were given as food." A pint of linseed oil would be sufficient as a laxative, while, daily, a drachm of sulphate of iron might be given in the food, and $\frac{1}{8}$ oz. of chlorate of potass in the water.

In the cases observed by Mr. Woods, both sexes were equally affected.

Symptoms.—The bones become light, spongy and brittle, so that they lose their power of affording attachment for the various tendons and ligaments, the result being that the animal, usually, dies of general paralysis after a few months. In the great majority of cases, the bones of the face, being naturally of a spongy nature, become specially affected, so that the face, from its flattened and swollen appearance, presents a grotesque resemblance to that of a hippopotamus.

CHAPTER V.

WOUNDS AND THEIR RESULTS.

WOUNDS IN GENERAL—GENERAL TREATMENT OF WOUNDS—OVER-REACHES—BRUSHING—SPEEDY CUTTING—BROKEN KNEES—OPEN JOINT—PUNCTURES FROM THORNS, ETC.—WARBLES AND SITFASTS—SADDLE AND HARNESS GALLS—INFLAMED AND FISTULOUS WITHERS—POLL EVIL—BURNS AND SCALDS—WOUNDS OF THE ABDOMEN—PERITONITIS AS A RESULT OF CASTRATION—BLEEDING AFTER CASTRATION—SCIRRHOUS CORD.

Wounds in General.

WOUNDS may be divided into—1, clean cuts; 2, punctures; 3, lacerated wounds, as broken knees, for instance; 4, bruises. We may have one or more of these varieties occurring from a single injury. There are five methods by which wounds may be repaired, viz.—1. By immediate union. Here, the parts being brought into exact apposition, unite in a few hours without any intervening material being deposited between them; hence there is no scar. The absence of all inflammation is a necessary condition for the accomplishment of this process. 2. By primary adhesion. In this there is a certain amount of inflammation in the part which causes a gluey fluid to be thrown out on the cut surfaces, that serves to bind them together in a few days.

This fluid, becoming afterwards organized, leaves a white scar. 3. By granulation. This is a tedious process, which is almost invariably accompanied by the formation of matter (pus). 4. By the union of granulations ; a process which takes place when union occurs on the sides of a gaping wound being brought together after suppuration has set in. 5 By healing under a scab. This is the natural method of repair.

We may have repair of a wound by one or more of these methods at the same time.

It is obvious that our treatment should be directed to obtain repair by either the first, second or fifth methods, in preference to the other two. Repair by the first can only occur when the cut surfaces are very limited in extent.

The more matter that is discharged from a wound, the greater will be the destruction of the muscle or skin in which the wound lies, the destroyed parts being replaced by fibrous tissue, which will but imperfectly fulfil the offices of the destroyed flesh or skin. Hence our efforts should be directed to prevent the formation of matter, which, we may say in general terms, results from the entrance into the wound of minute germs that float about in the air. As carbolic acid destroys them, we should employ it when practicable for this object. A solution of 1 to 40 in water may be adopted for general use.

General Treatment of Wounds.

Stop the bleeding.—There is rarely much difficulty in accomplishing this if the bleeding be from wounded veins only; cold water or some styptic, such as—

Tincture of the terchloride of iron-	1 part,
Water - - - - - - -	8 parts,

being generally sufficient. We may know that an artery is divided by the bright red colour of the blood, and by its spurting out. In this case we should endeavour to pick up the end of the artery nearest to the heart with the forceps or tenaculum (an instrument made for the purpose), and tie it with thread. Failing these means we may stop the bleeding by a touch of the red-hot iron. When an artery is partially divided the blood will spurt out in a jet; in this case, if we are not able to tie or to sear the vessel, it is advisable to cut it clean across, when the bleeding will probably cease, owing to the retraction of the ends of the artery within its sheath. Pressure also may be employed, especially if the wound be on one of the legs, when a tourniquet may be improvised by placing a round smooth stone just above the wound, and as near as possible on the course of the artery, while a pockethandkerchief, bandage, or other cloth, should be passed round the limb over the stone and loosely knotted. A stick should then be placed between the skin and the cloth at any convenient part, and twisted gradually round, so as to cause the stone to press on the artery. Our next step will be to—

Remove all dirt, clots of blood, and other foreign matters.—We may do this by allowing lukewarm water to flow over the part by means of a sponge. We should avoid touching the wound itself.

If the injury be very superficial without the parts being bruised, we may allow the blood to remain on so as to form a natural scab.

We should next—

Bring the edges of the wound together.—"If the muscular fibres be deeply divided, it is as well to allow the wound to remain open from six to eight hours; or if we employ sutures we should leave them loose, so that they can be easily tied afterwards. At all events, we leave the wound so far open that the blood and serous discharge may escape; and after a few hours we may wash out any clots, bring the edges accurately together, and so secure them." (*Spence.*) The only object of bringing the edges together without delay is to obtain immediate union, a process that will not take place if the wound be extensive, owing to the consequent inflammation. If we close the wound too quickly the clotted blood, &c., will not be able to escape.

The edges of a superficial wound may be kept in contact by strips of adhesive plaster. They may be made from cotton cloth covered with glue, or with one of the adhesive materials just mentioned. The hair round the wound should be previously shaved off.

Sutures.—If possible their use should be dispensed with, as they are apt to leave a blemish, and do not appear to be very successful in veterinary practice,

a fact that is probably owing to the difficulty experienced in keeping our patients at rest. Wire of different sizes, made for the purpose, forms the best general suture. The two kinds usually employed are the *interrupted* and the *twisted* suture. Each stitch of the former is complete in itself, while the latter consists of a curved pin, which is kept in position by thread wound between the two free ends in a figure of 8.

In making the stitches, the edges of the wound should be brought together, and the wire or pin, as the case may be, should, with the aid of a pin director, be passed through one side and out at the other. The sutures should be about half an inch from each edge, and should go pretty deeply, so as to obtain sufficient hold.

" Another similar stitch is to be made at the distance of about an inch from the first, and so on until the whole extent of the wound is in this way prepared for confinement by so many distinct and separate stitches; its sides or lips being all the time held together by an assistant. The general rule is to tie the middle stitches first: this, however, is of no great matter. The chief precaution required is that they be introduced at correspondent opposite points, so that, when they come to be drawn tight, they meet each other in straight or parallel lines, and confine the sides of the wound evenly and uniformly together, without wrinkling the skin or giving the parts any harsh or unnatural constraint." (*Percivall.*) Bandages may be of use in preserving the position of the parts, but their employment often causes unhealthy action of the wound with the formation of proud flesh, which is simply a swelled condition of the tissues from inflammation. "For the first six or eight

hours, cold dressings, as lint dipped in iced water, may be used; but this must not be applied too long, as it may do harm." (*Spence.*) The sutures should be removed after four or five days. If the wound inflames, whether from the sutures, plasters, or bandages, these appliances should be removed and the part should be bathed from time to time with some astringent, such as the white lotion, alum and water, or carbolic acid 4 drachms, water 1 pint. But if inflammation, to any marked extent, does not ensue, the wound should not be interfered with by fomentations, or by lotions of any kind.

The free escape of matter should always be provided for. This is particularly necessary in deep and punctured wounds. No oils, ointments, or other greasy applications should be used near the part, as their employment tends to cause the formation of matter, which necessitates repair by means of the tedious process of granulation. The use of caustics should also be dispensed with as much as possible, for the swollen tissues will contract on the subsidence of the inflammation, which may become aggravated by the irritation caused by the caustic. The moderate application of a caustic, such as carbolic acid, nitrate of silver, or blue stone, is often of great service in stimulating indolent wounds to healthy action, which it does by drawing an increased supply of blood to the part for its repair. With the same object in view, we may blister the skin round them.

As a general rule poultices and continued bathing with hot water should not be used to wounds, unless they are inflamed, or unless we desire to hasten the formation of matter, as these applications tend to

destroy the vitality of the part and prevent repair by the first two methods.

Appearance of wounds.—In common language we may say that a wound is *healthy* when it looks like a clean cut; *unhealthy* when it is white, covered with matter and large, soft granulations; and *inflamed,* or angry, when it is of a dark-red colour. The last-mentioned condition would indicate bathing with warm water and poultices.

If a *scab,* which has already formed, be wounded, it should be removed by poultices or by fomentations to allow of the escape of matter. But if a wound is healing under a scab in a healthy manner, it should on no account be interfered with, as this is the natural method of repair.

In the early stages of *bruises* we may often by the aid of cold applications cause absorption of the fluid which causes the swelling, and thus arrest the formation of matter; but if suppuration has already set in, we must hasten its progress as much as possible by poultices and hot fomentations.

Punctured wounds are the most dangerous variety; if they be at all deep they will heal only by granulation—hence the free escape of matter should be provided for by opening out the wound if necessary. Employ warm fomentations, in order to reduce the inflammation.

If the injury be accompanied by sympathetic fever, or if the horse be in a gross condition, he should be put on bran mashes, and should get a dose of physic. But if he is in a debilitated state, his strength should be kept up by liberal feeding and tonics.

Applications for wounds.—The objects for which lotions, &c., are applied to wounds may be summed up as follows:—

1. To allay the inflammation.
2. To prevent the entrance of putrefactive germs contained in the air.
3. To remove bad smells.
4. To stimulate the wound to healthy action.
5. To prevent flies settling on the wound.

Pieces of lint or soft cotton cloth soaked in water and placed on the wound may be used for allaying inflammation, or a solution of carbolic acid in water (4 drachms to the pint) may be substituted for the plain water in the case of recent cuts. I have found the following, based on Dr. Soulez's phenicated camphor recipe, to fulfil the conditions enumerated better than any other application I have tried.

Carbolic acid	1 oz.	
Camphor	5 ,,	
Resin	1 ,,	
Spirits of wine	15 ,,	Mix.

The carbolic acid is a deodorizer and stimulant. It destroys disease germs and drives away flies. The camphor has a soothing action, and also is repugnant to insects.

The resin forms, on the spirit evaporating, a delicate covering to the wound, while the spirit dilutes the other ingredients. This preparation is particularly useful in India and the tropics.

Carbolic acid 4 drachms, water 1 pint; solution of

alum and water; white lotion; Friar's balsam, and equal parts of tincture of myrrh and tincture of aloes may be employed.

Overreaches

Are wounds made by the inner edge of a hind shoe striking the fore foot or leg. The injury is generally inflicted just above the heels, though it not unfrequently occurs on the back tendons.

This accident is liable to happen when the horse is allowed to gallop uncollectedly through heavy ground, or when landing over a fence on to deep soil.

Preventive Measures.—When riding the horse "keep hold of his head," and do not allow him to "sprawl about." Get the inner edges of the hind shoes, at the toes on the ground surface, bevelled off. Have the hind toes made "square" by getting square-toed shoes, with side clips, put on the hind feet, whose toes are then rasped flush with the front of the shoes. These precautions in shoeing are particularly necessary for steeplechasers and hunters.

To guard against this injury I have seen a celebrated trotting mare wearing circular india-rubber guards, which were made to draw on over the foot, and to hang down so as to cover the parts immediately above the heels.

Treatment.—Our chief object in wounds just above the heels is to prevent moisture from getting to the wound, which is on a part whose substance is so akin to horn that the presence of water would tend to cause

its decomposition. Hence remove any jagged ends that may be present, as the fluid resulting from their decomposition would irritate the wound; and apply the carbolic and camphor lotion given on page 167; tincture of myrrh; or tincture of arnica. The alcohol will, on evaporating, leave a resinous covering which will exclude damp; it also stimulates and dries up the cut. If these applications be not at hand, use a little ordinary spirits. Keep the feet dry.

If the heels be much bruised, the part should be poulticed.

When the overreach is on the back tendons, it may have been made by the inner edge of the hind shoe, or by the point of the toe, as I have seen in the case of a steeplechase horse. When a wound is of this nature, the part should be put into a state of rest by means of a high-heeled shoe, and the horse might get a dose of physic, and be kept on laxative diet. The part should be frequently bathed with warm water, and fomented by covering it with a soft pad of lint or cotton, which has been previously dipped in warm water, and then applying oil silk and a flannel bandage over it. This injury should be treated in the same manner as a sprain of the back tendons. Even when the skin alone is divided, I cannot advise the use of sutures, for the tendon itself can by no possibility have escaped being bruised, although no division of its fibres may be apparent.

Brushing

Is caused by the outer edge of the inner quarter of a shoe, or sometimes by the rough clenches of its nails, wounding the fetlock of the opposite leg.

It may be due to weakness, when, with increased strength, the habit frequently leaves the animal; to fatigue; to defective conformation, especially when the horse "turns out his toes;" to the fact of the outer quarter of the foot being higher than the inner—an arrangement which will cause the fetlock joint to be inclined inwards, &c.

Preventive Measures.—Lowering the crust of the outside quarter of the foot which gets hit, or thickening the inside half of its shoe, will generally serve to remove the fetlock out of the line in which the offending foot moves. The part of the shoe which inflicts the injury should be eased off with the file. Strange to say, lowering the inside quarter of the crust of the foot struck, sometimes succeeds in preventing brushing and also speedy cutting; such cases possibly being those of horses that "turn their toes in." On no account, as is sometimes the practice, should the wall of the foot which inflicts the wound be thinned by rasping, as doing so will weaken a part which is intended by nature to bear weight. Lowering the toes of the hoof, or thickening the heels of the shoe, so as to make the foot more upright—the angle of the profile of the fore foot should be about 50°, of the hind about 55°—will sometimes prevent brushing; with this object in view the

horse may have to be shod, or his shoes removed, once every three weeks.

Horses will rarely brush if shod *à la* Charlier.

If the measures which I have detailed do not succeed, a boot or a thick india-rubber ring should be worn. An ingenious guard may be made with a flannel bandage about a foot broad, with which a few turns are taken round the fetlock and leg, care being observed to keep all the turns at the same level; a piece of tape is now tied round the leg just above the fetlock and at the centre of the bandage, the upper part of which is then turned over the lower half, so as to form an efficient boot. This should only be a temporary measure, as the pressure of the tape, if continued, will be apt to leave a mark on the hair. This bandage is in common use.

I have employed, most successfully, the following guard with a steeplechase horse, who brushed and speedy-cutted himself, from the knee to the fetlock, with the greatest impartiality. It was made by taking a piece of thick felt (such as is used for saddle-cloths) about 15 inches long, shaped at one end to cover the inside of the fetlock and then tapered gradually off towards the other end. This was placed on the inside of the leg, reaching just below the fetlock and extending upwards a few inches above the knee. A woollen bandage was now put on over the strip of felt, in the manner delineated in Fig. 2. When the folds of the bandage reached as high up (just below the knee) as they were meant to go, the free upper end of the felt was turned down and the bandage neatly rolled over it, so as to prevent the piece of felt from working loose or

shifting its position. Though not as neat-looking as a leather boot, this arrangement is, I think, more effective. It can be readily employed as a make-shift.

Treatment.—In slight cases, the application of cold water or of an astringent (see page 167) will be sufficient; but if the wound be inflicted on a previous " brush," the part should be poulticed until the scab comes off, and then treated with an astringent. The same course should be observed when there is much inflammation present.

Speedy Cutting

Is, correctly speaking, the act done by the horse when he wounds the inside of one fore-leg near the knee by the other fore-foot.

I have known a racing pony speedy cut on both hind legs just below the hocks.

Some horses make a compromise between brushing and speedy cutting by hitting themselves on the side of the cannon bone midway between the knee and the fetlock.

The seat of the injury is generally a little below the knee, although it may be just above it on the internal lateral prominence of the lower extremity of the bone of the fore arm, the radius. These lateral processes are very prominent in high-bred horses. Their office is to afford attachment to the lateral ligaments of the knee joint. Speedy cutting is essentially an injury peculiar to well-bred animals with high action. The wound is

usually inflicted at the gallop, or when the horse is dancing about from restiveness. I have observed that horses which turn their toes out are very prone to speedy cutting as well as to brushing (see remarks under that heading). Horses generally do not speedy cut until they begin to tire in the gallop.

Before purchasing a horse which one may require for fast work, one should examine his legs to see if there be the marks of old speedy cuts, and also whether there be any signs—as, for instance, the hair being rubbed—of the animal having worn a speedy cutting boot. A bony deposit of more or less extent will often be found on and around the spot at which a previous speedy cut has occurred.

The preventive measures are of a similar nature for speedy cutting, as they are for brushing. Here, too, the Charlier system of shoeing seems to act equally well. Sometimes, removing the shoes and adjusting the "bearing" surface every three weeks will prevent this injury.

Young horses that speedy cut may subsequently abandon the habit as they grow older and stronger.

Symptoms.—Heat, swelling, with more or less fever and pain. In two or three days an abscess may appear, or the part may be wounded rather than bruised, and matter (pus) be formed.

Treatment.—If matter (pus) be present, a free vent should be given to it, the part should be bathed and afterwards treated with the white lotion; alum and water; or carbolic oil (1 to 20). In any case, give at first a purgative, keep the animal on laxative food

(unless he be in a debilitated state), and foment the part with warm water repeatedly. If, after some days, when all heat and inflammation have ceased, we find that the swelling feels like a sac—containing fluid—in other words, if it becomes changed into a serous abscess, we should open it by a horizontal incision at its lowest point—so as to allow the hair to grow over the subsequent scar—then apply cold applications, and bandage moderately tight so as to induce absorption by pressure. Sometimes, even after the abscess is opened, it becomes hard from the exudation becoming organized. In fact, to cause the breaking up of this deposit, we may determine an increased supply of blood to the part by repeated blisters with the biniodide of mercury. A seton is not admissible, as it is liable to thicken the skin and thus leave a blemish.

Broken Knees

Is the term applied to any wound inflicted on a horse's knee or knees by falling, or by hitting himself.

If, after a horse has been "down," there be left any blemish by which it can be seen that this accident has happened, such a horse is legally unsound. This law is most reasonable, because it is impossible to estimate correctly the amount of injury sustained by the affected knee or knees, for joints very frequently become permanently weakened by blows which leave little or no disfigurement.

In examining a horse to see if he has been "down,"

one should, in doubtful cases, closely view the knee in profile, so as to detect any existing roughness of the hair on any particular spot on the front of the joint, by which it may be perceived that the horse has broken his knees on some former occasion; for, unless the edges of a wound unite with a degree of accuracy which we cannot expect to find after this accident, the hair will not lie perfectly smooth and level. The skin should be examined for the scars of former wounds.

Anatomy.—On taking a front view of the knee of the horse—which part corresponds to the human wrist—we find that it is composed of two rows of bones, three in each row, and that they are so arranged that there are three distinct joints, viz., one between the radius or bone of the fore arm and the upper row; a second between the latter and the lower row, which forms a third joint, with the heads of the cannon and splint bones. There is most motion in the upper joint, while the last-named possesses the least movement; on this account, in a case of broken knees, the injury usually is inflicted on the upper joint, seldom on the middle, and very rarely on the lower one. Besides the six bones I have mentioned there is a seventh bone, the trapezium, placed at the back of the upper row of bones to serve as a lever-like attachment for the tendons of the muscles which flex the knee; occasionally we meet with an eighth and very small bone—the pisiform—at the back of the lower row.

In well-bred horses, the trapezium is often very prominent—a most desirable "point." This confor-

mation may give the animal to inexperienced eyes a false appearance of being "tied in below the knee."

Over the front of the knee passes the broad, flat tendon of the muscle (extensor metacarpi magnus) which extends that joint; while between this tendon and the bones of the knee, in order to prevent friction, are placed two bursæ or sacs, containing synovia (commonly called joint oil.). On the outside front, if I may use the term, passes the tendon of the muscle (extensor pedis) which, as its name implies, serves to extend the foot. And finally the skin, with its subcutaneous cellular tissue, covers the knee.

At first glance we might suppose that, from an accident, the tendon in front of the knee might be laid bare without injury to its underlying bursæ, but such is rarely if ever the case, for when pressed upon, the sacs bulge out at each side of the tendon, and get perforated in the event of the tendon becoming exposed. The tendon of the extensor pedis, except in extremely grave cases, is, on account of its side position, hardly ever laid bare or injured.

Treatment.—As there are two modes of treatment, applicable according to the gravity of the injury, for broken knees, it may suffice for all practical purposes, to classify these accidents under two corresponding heads: 1st. When the skin only is bruised or cut, without the tendon being exposed; 2nd. When the tendon is exposed. In the latter case we have an escape of synovia, and the injury may be further complicated by the bruising or division of the tendon, both of which accidents will occasion "open joint;" while we may

even have one or more of the bones of the knee fractured.

In a case coming under the first heading, our efforts should be directed to prevent sloughing, a process which will surely occasion blemish, with a consequent depreciation of the animal's market value when he is cured. Having this object in view, we should, after gently bathing the wound for a quarter of an hour or so, in order to remove dirt and grit, put the horse on the pillar reins so that he may not injure the part by bending the knee when attempting to lie down, or by scratching it; and give a physic ball and laxative food. The part itself should be bathed, four or five times a day, with some astringent application, nothing being better than 4 drachms of carbolic acid to one pint of water; or a solution of as much alum as the quantity of water employed will dissolve. One should dip a sponge into the lotion and gently press it against the leg above the knee, continuing the process for four or five minutes. In this way the vitality of the part will not be interfered with.

We must regard inflammation as the natural process by which blood is determined to an injured part, in order to furnish materials for its repair. In fact, it is a process of growth, which the too long continued application of cold and astringents, by cutting off the supply of blood, may check to such an extent that repair will not take place in the injured structures. All that we require is to prevent, as much as possible, the inflammation proceeding to the suppurative stage—the one in which pus (matter) is formed.

This bathing of the part should be continued for

some days, according to the nature of the injury. While tied up, the horse should have a rug or piece of sacking, fixed in front of him, and on a level of his chest, to hold his hay.

If the animal has to be kept tied up for a long time, slings should be employed. He should on no account get his freedom until there be not the slightest probability of the skin cracking in the event of his bending the leg. This is a most important point to be attended to.

"Very often a small piece of dead tissue will be seen, presenting a deadened, white appearance in the wound. This should be removed by the curved scissors, otherwise it will act as a foreign body." (*Williams.*)

The treatment of a case in which the tendon is exposed, or in which there is "open joint," is as simple as that which we have just described. The white appearance of the exposed tendon and the flow of synovia will readily show the nature of the injury. No time should be lost in putting the horse in slings if possible, and in rubbing in strong cantharides blistering ointment below and on both sides of the wound and to the back of the knee, so that all movement in the part may be prevented. Of course, none of the blistering ointment should touch the wound itself. It should not be rubbed on the skin above the wound, for it might then "run" into it and cause great irritation.

"The blister acts by removing pain, limiting motion, exciting the formation of healthy granulations, and (as a result of the swelling it produces) causing the approximation of the surfaces of the wound." (*Williams.*)

The lacerated parts should on no account be

interfered with further than what is sufficient to clean them ; but the synovia and other discharges should be allowed to accumulate, so that on drying they may prevent admission of air to the wound.

I have seen a case treated successfully as above, in which dried synovia—the accumulation of several weeks—extended from the injured knee to the hoof, resembling somewhat an icicle in appearance.

If the fever be high, as will be indicated by a quick and hard pulse, 10 drops of Fleming's tincture of aconite may be given in a pint of water ; this may be repeated, with an interval of three or four hours—diminishing the aconite to 6 or 7 drops—once or twice.

As soon as the effect of the blister has begun to subside, another should be rubbed in.

If the tendon gets crushed instead of being cut, the crushed part will slough out after four or five days, and will leave the joint exposed. Whether this occurs by sloughing, or by laceration of the tendon, there is great danger to the life of the patient, while even if he recovers he will have a permanently stiff knee joint. If the injury be complicated by fracture of one or more bones of the knee, recovery may be regarded as nearly hopeless.

After the fever has passed off, the horse's strength should be kept up by fairly liberal feeding.

It sometimes happens that in a case of broken knees, the skin of the lower edge of the wound has been rumpled back by the horse sliding forward on his knees, when on the ground, at the time of the accident, and a sac has been thus formed into which dirt has entered. In this case, the sac should be probed, and, at its lowest

point, a horizontal orifice—so that the subsequent cicatrix may be concealed by the hair—should be made with the knife to allow of the dirt, &c., working out. Occasionally this sac is not apparent for some days; it will then be found soft to the touch, and full of matter when it is opened—as it should be—at its most dependent part. The little finger may generally, with advantage, be substituted for the probe.

The edges of the wound should on no account be brought together by stitches, for as soon as the horse bends his knee he will tear them out, and thus leave a serious blemish. The wound should not be poulticed nor fomented for any continued time, for either proceeding will tend to destroy the vitality of the part. The wound should not be probed except when a sac is formed—and then the instrument should be kept well away from the joint—because in pushing the probe about there is the greatest danger of seriously increasing the injury, owing to the tendon and joint being so very close to the surface. Bandages should not be applied to the limb, as their use tends to cause congestion of the bloodvessels and consequent diminution of material brought by them for repair of the wounded surfaces. At first there is often the appearance of a good deal of so-called proud flesh. This, as pointed out by Professor Williams, is simply due to a swollen condition of the wounded tissue, which will abate of its own accord as soon as the inflammation subsides; on this account we should carefully avoid irritating the inflamed parts by the application of caustics, which should be reserved to stimulate the wound, if necessary, to healthy action

after the inflammation has abated; we may then use the nitrate of silver.

Kerosine or paraffine oil, or a mild blister, may be subsequently used to stimulate the growth of hair.

Open Joint

Is one of the most serious accidents which can happen to a horse, for he is very apt to die from the ensuing constitutional disturbance, while, if he recovers, there is a strong probability that he will have a permanently stiff joint.

This injury usually occurs on the knee or hock, and is generally caused by falls, kicks, or by inexperienced persons probing about an articulation which has been hurt.

The most insignificant-looking wound near a joint, if it causes the admission of air to the articulation, may be fraught with the gravest consequences. No unnecessary probing should be allowed on any account.

Symptoms.—There is usually a flow of synovia (joint oil) from the part, though this may take place from wounded synovial sacs without the joint having been penetrated. The discharge becomes more and more unhealthy, until at last it becomes mixed with matter and blood, and assumes a fœtid odour. If it tinges a silver probe black, we may feel assured that the bones are affected. After two or three days the joint swells and becomes very painful, while high fever sets in. In unfavourable cases, the animal dies from exhaustion.

If he survives, the joint may become destroyed by union of its bones, which is produced by the conversion into bone of the watery fluid exuded by the blood-vessels as a result of inflammation.

Treatment.—The best general treatment is to apply a blister round the wound as prescribed under "Broken Knees." This should be always done when the injury is on the knee.

The intense pain, fever, and subsequent union of the bones which form the involved joint, are due, in unfavourable cases, to the inflammation being extremely aggravated by the entrance into the wound of putrefactive germs which float about in the atmosphere. When a blister fails to close up the orifice, and to prevent irritation due to the entrance of air, or when it has not been applied, we should endeavour to destroy the germs which have already settled on the wounded surface, and to stop the future ingress of others. With these objects in view, we may syringe into the wound, a few times, the following application :—

Carbolic acid - - -	1 part.
Glycerine - - - -	4 parts.
Water - - - -	20 parts.

The glycerine is used to ensure the perfect solution of the carbolic acid. It may be dispensed with if the acid be pure, in which case we may use the carbolic acid in the proportion of 1 to 30 of water.

The wound should be protected by a thick covering of cotton wool, or lint, steeped in the carbolic lotion. Care should be taken that the cotton wool or lint be

kept well saturated with the application, and that, if pus (matter) soaks through, fresh coverings be applied; for, if the pus be allowed to form a communication between the wound and the external air, disease germs will quickly work through into the injured joint.

At first it is generally advisable to give a dose of physic (aloes or linseed oil), and, if there be high fever, 10 drops of Fleming's tincture of aconite in a pint of water. This drench may be repeated after an interval of three or four hours. If there be very great pain, give, instead of the aconite, 3 drachms of opium, or 3 ozs. of the tincture. The opiate may be repeated. Laxative food, such as bran mashes, carrots, etc., should be given. When the fever has abated, the strength should be supported by corn, skimmed milk and water, beer, &c. If, in the first instance, the shock to the system has been great, liberal diet, and stimulants, such as half-a-gallon of beer, half-a-bottle of spirits, mixed with water, through the day, should be prescribed. Slings, if obtainable, should be employed, so as to enable the animal to give the affected limb as much rest as possible, and to prevent the flexion inseparable from getting down and up.

Punctures from Thorns, &c.

The accidents are most common about the fetlock, knee, and forearm. When inflicted on the latter, they are apt to give rise to serious consequences, owing to the tendency matter has, on forming, to burrow down towards the knee, by reason of the tendinous nature of

the muscles of the part. If a thorn deeply penetrates the skin close to a joint, it is advisable, when it cannot be removed without cutting down upon it, to shave the hair and to blister the spot. The seriousness of the injury may generally be guessed at from observing the extent of the ensuing lameness. The blister, by preventing motion, will obviate the possibility of the thorn working further in; by causing external swelling, it lessens the pain. It draws an increased supply of blood to the affected part for its repair; it prevents the entrance of air, and, consequently, the formation of matter, and destruction of tissue; and it softens the skin, so that the thorn or other foreign body will readily slough out, If, on the contrary, poultices and fomentations be used, they will cause the edges of the wound to become sodden, and to lose their vitality by removing the blood from the wounded vessels. Much harm is often done by searching for thorns, &c., with the knife. When the puncture is well away from a joint, all the treatment that is usually necessary is to apply warm fomentations and poultices, and, when matter forms, to give it vent with the knife. Capped knee and capped fetlock are sometimes caused by thorns penetrating the synovial sacs of these joints.

Warbles and Sitfasts.

Warbles are tumours which form on the skin, from irritation due to the pressure of the saddle or collar, and are induced by a heated state of the system, and by irregular work.

With riding horses, the usual spot for a warble to appear is just behind the cantle of the saddle, the general cause being that the saddle which inflicts the injury is too short for the rider. When this is the case, the weight is thrown on the cantle, and if the horse be made to go fast or to jump, the skin immediately behind the cantle being pressed downwards and backwards, becomes forcibly wrinkled at each stride the animal takes, the natural result being that inflammation takes place and a tumour appears; a repetition or two of this process increases the evil; matter is formed, the warble suppurates, and the horse is laid up for a month or more. I have seen so many cases of sitfasts having been produced by saddles which were not long enough for their riders, even after they had been stuffed and restuffed, that I am confident I am correct in laying the blame, in nine cases out of ten, to shortness of the tree. The length of the saddle should principally depend on the length of thigh of the horseman.

Some riders are very apt to give horses sore backs by the unworkmanlike practice they affect, when riding, of sitting far back on the cantle of the saddle, while they stick their toes well out in front of the horse's shoulders; the consequence being that the weight is thrown on the cantle at every stride, instead of on the centre of the saddle. The knee joints of a rider, with a proper seat, give and take to the motion of the horse, so that there is no bumping up and down.

The stuffing and lining of saddles should be attended to. If a saddle cloth be not used, the pannel is apt to get hard from the absorption of perspiration, and should be dried, beaten, and brushed, as required. Leather

saddle-cloths, which should be a little larger than the pannel, are excellent for preventing sore backs. If constantly used, they do not require any dressing, as the oily matter of the sweat will keep them soft and pliable.

If a horse be thoroughly and quickly dried underneath the saddle on returning from work, no evil will result from the gear being removed while the animal is still warm; but if the rubbing down be neglected, a warble will be the probable result.

If it be not convenient to groom without delay a horse which returns hot from a ride, the girths should be loosened and the saddle should not be taken off for, at least, twenty minutes, if not half an hour, during which time it would be all the better to walk the horse about.

Cold water and rest will generally be sufficient to reduce a warble that is taken in time. If it continues hot and inflamed, warm fomentations and poultices should be applied. When matter is formed, which fact may be known by the tumour becoming soft to the touch, the abscess should be opened with a knife, and then treated as an ordinary wound. If the tumour delays in "coming to a head," it should be blistered with the biniodide of mercury ointment (1 to 8 of lard) until it bursts of its own accord, or is in a fit state to be opened by the knife.

The best instrument for opening an abscess is a Symes' abscess knife. The part should be poulticed with carrots, turnips, or bread, until all matter comes away. The sore may then be treated as an ordinary wound. If the part around the wound continues

swollen, it should be blistered with biniodide of mercury ointment (1 to 8 of lard) once or twice.

The horse should not be used for saddle work until the swelling has entirely subsided, and the wound healed. For some time after that, a solution of alum and water, or salt and water, may be applied to the part to harden it. The stuffing of the saddle should be carefully attended to. Nothing is better by which to relieve the backbone of pressure than one or two pieces of thick felt sewn to the pannel of the saddle at each side.

Neglected suppurating warbles are apt to take on an angry, unhealthy-looking appearance, having a hard, leathery margin round their circumference; they are then called *sitfasts*. The hard, dead skin that surrounds the sore, being a foreign body, must be removed, which may be done by continued poulticing. If this treatment does not succeed, cast the horse and remove every particle of the hard skin with the knife, and treat the sore with an astringent, like an ordinary wound.

After a case of sore back has been completely cured, a horse will often flinch, for a time, when the part is touched, or even contract the habit of "crouching down" for a minute or two after being mounted. Memory appears to be the predominant faculty in the mind of the horse.

Girth and Harness Galls.

In ordinary saddle work the girths often cut a horse, from the person saddling the animal neglecting, on

girthing up, to pass his finger between the girth and the skin, so as to prevent the latter from becoming wrinkled. Girths of raw hide or of cord, which allow of ventilation, are often useful for avoiding galls. The Fitzwilliam, which consists of a broad girth attached to two buckles at each side with a narrow one over it, is, I have found, the girth which is least liable to gall a horse. If the skin is very tender, a piece of lamb-skin may with advantage be sewed round the girth, with the wool towards the sensitive part.

Salt and water, or alum and water, rubbed into the shoulders will often help to harden them for harness work.

Treatment.—Any one of the applications for wounds may be employed.

While the horse's back continues sore, I need hardly say that he should not be worked.

Whenever a scab becomes bruised or hurt it should be poulticed until it falls off, so as to give free vent to any new matter that may form; after that, the wound should be treated with an astringent lotion, or with cold water.

Inflamed and Fistulous Withers.

Saddles usually gall horses on the withers, on account of having too little stuffing in the pannel under the pommel; by the arch of the gullet-plate being too broad; or by the points of the tree being too far apart. Saddles with the pommel cut back are, I think, more

liable to gall a horse than are those with it cut straight down.

Horses with naturally high withers are very liable to get them wrung by ill-fitting saddles. If it be inconvenient to have the pannel properly stuffed, a pad may be made as follows :—Take six or eight pieces of felt, each being about four inches broad and six or seven inches long. Arrange them so as to form two pads of equal thickness, about four inches apart, on a piece of serge thirteen or fourteen inches broad and seven or eight inches long; over the whole, place a similar piece of serge, and sew them together so as to form one pad, the centre and thin part of which will lie over the withers, while the padded sides will raise up the pommel. This form of pad is very useful with racing-saddles. A folded handkerchief or towel placed on the withers is of little use, for it simply prevents them being cut by the iron gullet-plate, but does not relieve them from pressure.

When saddle-cloths or *numdahs* are used, the groom, before girthing up the horse, should, with his finger, raise the cloth well up into the gullet, so that it may not press tightly down on the withers.

As a temporary measure, in a case of sore withers, strips of felt about four inches broad and eight or nine inches long, may be sewn to the pannel of the saddle, in order to keep the gullet-plate from hurting the injured part. The pieces of felt should be placed well down on each side, so as to allow a free current of air to play over the withers. This is a much better plan than that of using a thick felt saddle-cloth.

After a case of sore withers, a horse will often, like as

he does after he has had a sore back, flinch for months, or even years, on the part being suddenly touched. If the flinching be simply due to the remembrance of former pain, the animal will allow the part to be handled, if the operator commences by gently rubbing the skin at some distance off and then gradually "works up" to it.

Treatment.—If the bruise be but slight, cold applications may be sufficient to reduce the inflammation and swelling. But if this desirable result be not obtained, blister the part with the biniodide of mercury ointment (1 to 8 of lard), in order to prevent the matter from burrowing down so as to cause fistulous withers. Free vent should be given to the pus, while the part may be bathed with warm water and poulticed, and afterwards treated with an astringent.

If a piece of skin be left in the centre of a wound, detached from the remainder of the skin, it should be torn off or cut out with a knife, for, if this be not done, it will act as a foreign body and keep the wound open. When the connection of small pieces of skin with the remainder of that surface becomes severed, they appear to lose their vitality. We may see this happening when cross lines are deeply burned into the skin during the operation of firing, so as to form diamond-shaped marks. The skin is characterized by strong sympathy existing between its various parts. When any portion of this surface is deprived of the influence of this sympathy, its function, and, consequently, its vitality become impaired.

If matter has already formed, the tumour should be freely opened with the knife and treated as before

described; or a seton, smeared with the biniodide of mercury ointment, may be passed through the lowest point of the sinus.

We may know that matter has formed by the tumour feeling soft, and from the fact of the hair falling off the "point" of the abscess.

When, from neglect, the walls of the fistula have become callous, the following application, injected, or applied on cotton wool, may be tried with advantage :—

Corrosive sublimate - -	$\frac{1}{4}$ ounce.
Hydrochloric acid - -	5 drops.
Rectified spirits of wine -	2 oz. (Gamgee).

If the bones of the vertebræ become involved, they should then be cut down upon, and the dead or diseased portion should be removed.

In all cases, if possible, an opening should be made at the lowest point of the sinus for the escape of matter.

Blisters applied around the sinus are particularly useful for stimulating the part to healthy action.

Give a dose of physic, and keep the animal on laxative food.

Care should be taken that the animal is not allowed to rub his sore withers against the frame-work of his stall.

Poll Evil

Is similar in its nature to fistulous withers. It consists of an abscess or abscesses which form immediately behind the ears of the horse, as the result of blows, or,

according to Professor Williams, from the continued use of a tight bearing-rein. Mr. Percivall, very correctly, I think, states that it is often caused by the cart-horse rubbing his poll against any convenient object, when suffering from irritation due to the wearing of hard, heavy, and ill-fitting head-collars.

Treatment.—If matter has not formed, blister the part; but if the abscess be ripe, open it and treat as for fistulous withers.

Burns and Scalds.

Treatment.—If blisters have formed, puncture them with a needle to let out the fluid. Cover the parts with lint or cotton wool, on which has been smeared Carron oil, which is made by mixing equal quantities of linseed oil and lime water. If this be not available, use olive, or any other sweet oil; or dust the wound over with fine flour.

If the injured parts begin to separate from the healthy tissues, apply poultices and treat as an ordinary wound. If the pain be great, give 3 drachms of opium in a ball, or 3 ozs. of the tincture in a pint of water as a drench, and keep up the strength by a quart of beer, or a couple of glasses of spirits mixed with water, every now and then. A severe burn or scald causes great shock to the system, hence the necessity for supporting the vital powers after these accidents.

Wounds of the Abdomen

May consist of simple injury to the skin and superficial muscles, or of an opening into the abdominal cavity, an accident which may, very probably, be accompanied with, or followed by, protrusion or puncture of the intestines and inflammation of the peritoneum—the membrane which lines the abdomen and covers the bowels. Cases which come under the first heading may be treated as simple wounds, while precautions should be taken to prevent matter (pus) working down through the underlying structures, and to allow it free exit. In the graver cases, a large dose of opium, say $\frac{3}{4}$ oz., may be given in order to arrest the action of the intestines, as their movement might give rise to peritonitis (inflammation of the peritoneum), or seriously aggravate it if already existing. Opium has a special power for checking the motion of the intestines. In order to nullify the action of the putrefactive germs which are contained in the air, a solution of 1 part of carbolic acid to 40 of water may be freely applied to the part, and introduced into the wound by means of a sponge and stick, or other suitable arrangement. Ready exit for matter should be provided, the knife being used if necessary. The abdomen should be carefully bound round with a sheet, and means for reducing the protrusion of the intestines should be adopted, as the case may require. In order to keep up the strength while giving the bowels the least possible amount of work to do, food in a concentrated form should be given, such as skimmed milk with the yolks of hard-boiled eggs

mashed up in it, oatmeal gruel, &c.; boiled barley and a linseed mash now and then may be of use. If constipation ensues, a little linseed oil, say a quarter of a pint, may be mixed through the food three times a day. As peritonitis is an extremely fatal disease, our efforts should be directed to prevent its occurrence, and, if it sets in, to mitigate its effects. We should also take proper precautions to prevent matter from burrowing down and forming abscesses.

Symptoms of Peritonitis are very quick, wiry pulse; great depression, pain, and disinclination to move; coldness of the legs and ears; hurried breathing. Up to the last the lungs seem to act well, while the heart appears to be unable to supply them with blood. In fatal cases, the animal dies after a few hours' suffering.

Peritonitis as a Result of Castration.

As a portion of the peritoneum (see preceding section) covers the testicles, it becomes wounded during castration, while inflammation of its surface may ensue a few days after this operation has been performed. The symptoms are similar to those described under the heading "Wounds of the abdomen." Though treatment appears to be of little avail, still we may try the effect of a large dose of opium, fomenting the abdomen by enveloping it in rugs wrung out of hot water. The scrotum may be frequently bathed with warm water.

Bleeding after Castration.

Owing to weakness of the walls of the blood-vessels, unusual size of the artery, unskilful manipulation, or other causes, serious bleeding may occur after castration. It may, however, be arrested by carefully plugging the scrotum well up on both sides with fine tow. Pounded ice or very cold water may then be applied to the part. The tow may be removed after a few hours. Some practitioners recommend that an enema or two of water, as cold as possible, should be given. When the plugging "has not checked the bleeding, we have applied a folded horse-rug, saturated with cold water, across the loins for a few minutes. This acts as if by magic." (Editor, *The Veterinary Journal.*)

Scirrhous Cord

Is a tumour growing on the end of the cord from which the testicle has been removed. It is usually supposed to be due to irritation caused by the cord, at the time of castration, having been left too long and consequently having become pinched on the wound healing; by a scale of iron being left after the hot iron; or by a portion of caustic when caustic clams have been employed.

"This growth may not be apparent for even years after castration, though the scar made in the scrotum continues to have, during that time, a peculiar pursed-up appearance. These tumours occasionally grow so large that they interfere with the horse's movements.

"Its removal is effected in the same manner, and is not attended with greater danger, than is that of the testicles during castration. The only difference being that, when operating for scirrhous cord, the integuments of the scrotum should, first of all, be dissected away. No time should be lost in getting it removed. The preventive measures are careful breaking down with the finger, of the adhesions of the scrotal wound, once or twice, within a week or ten days after castration.

"In looking at a gelding with a view to purchase, it is good practice to pass the hand over the scrotum, so as to find out if the parts be free from all hardness.

"Scirrhous cord is an unsoundness." (Mr. A. Johnstone, M.R.C.V.S., has kindly placed at my disposal the foregoing remarks on scirrhous cord.)

It seems probable that this affection is not unfrequently caused by unnecessary pulling at the cord while the horse is being castrated.

Professor Williams recommends that the tumour should be dissected away from the scrotum as high up as possible, and that, after applying a flat clam to it close up to the abdomen, it should be slowly twisted off with the hand.

CHAPTER VI.

Herniæ

ARE caused by the protrusion of a portion of the bowels into a sac formed by the peritoneum—the membrane which lines the cavity of the abdomen.

Hernia at the Navel (umbilical hernia), being situated in the middle line of the abdomen, can scarcely escape the observation of the most inexperienced. The tumour is usually soft to the touch, and can be reduced by manipulation. As long as it remains in this condition, we may assume that there is a portion of the peritoneum only protruding. But when it is hard and of varying size, we may conclude that a portion of the intestines, with its contained food, has escaped from the abdomen into the sac. The danger here consists of this portion of the bowels becoming strangulated, with subsequent mortification of the part.

Treatment.—Unload the intestines by giving a pint of linseed oil and by keeping the animal without food for some hours. Place him on his back, and, having returned the tumour, take up as much loose skin as possible, and pass two steel skewers through it at right angles to each other, and directly over the opening. Wrap several turns of cord between the skewers and the abdomen, so that all the enclosed skin will become strangulated, and will, in time, drop off: while sufficient

irritation will be established to cause the closure of the orifice. The cord may, before being used, be smeared over with some caustic, such as corrosive sublimate and lard.

When the hernia occurs on the abdomen, but not at the navel, it is called a *ventral hernia*, and may, when small, be treated in the manner just described.

Each testicle and its cord are surrounded by a pouch of peritoneum, which descends from the abdomen into the scrotum. The passages thus formed between the abdominal cavity and the interior of the scrotum are called the *inguinal canals.* Owing to their relaxation, unusual size, or other causes, a portion of the intestines may enter them, and even descend into the scrotum; the former accident constituting *inguinal*, the latter, *scrotal hernia.* As one effect of castration is to cause contraction of the inguinal canals, geldings are much less prone to these two forms of hernia than are stallions; while mares are nearly exempt.

Scrotal Hernia, which appears as a tumour in the scrotum, may be either chronic or acute. The latter affection, if unrelieved, causes death in a few hours; while the former, as we may not unfrequently observe in India and other countries where stallions are generally employed, may continue for several years, causing little or no inconvenience to the animal. When entire colts are thus affected, it is usually good practice to defer castration until they are two or three years old, for not unfrequently, the hernia, by that time, disappears altogether. If it does not do so, the colt may be castrated by the "covered

operation." When examining a horse for scrotal hernia, Mr. Percivall recommends the operator to "grasp the tumour with one or both hands, softly but closely, and then let another person cough the horse, and the swelling will be found suddenly to expand under the effort, and as quickly to recede again." The *symptoms of acute scrotal hernia*, besides the existence of the tumour in the scrotum, are dulness, disinclination to move, followed by great distress, colicky pains and death.

The *symptoms of inguinal hernia* are violent colicky pains, during the paroxysms of which the animal generally evinces a strong inclination to lie on his back. "The testicle on the hernial side, though felt drawn up, irregularly descends and ascends." (*Percivall.*)

The treatment of inguinal hernia, and of the acute scrotal form, by returning the intestine back into the abdominal cavity, should be undertaken only by a veterinary surgeon. After the reduction of the hernia, it is advisable to castrate the stallion by the "covered operation."

CHAPTER VII.

FRACTURES.

Fractures in general.

As fractures of the bones of the horse are, as a rule, but little amenable to treatment, owing to the difficulty of " setting " and reducing them, and of keeping the patient at rest, I will content myself with describing the comparatively small number of these accidents which may be successfuly treated by an amateur.

A fracture may occur straight across the bone, obliquely, or longitudinally (lengthwise).

The chief varieties of fractures are as follows :—

1. *Simple fracture*—when the bone is broken at one part only, while the parts surrounding the seat of fracture are not injured in any way. As the periosteum —the covering membrane of the bone—is generally very strong in the horse, it often keeps the broken surfaces together and thus prevents the fracture from becoming a compound one.

2. *A compound fracture* occurs when the broken bone wounds the surrounding soft parts.

3. When the bone is broken into several pieces the injury is called a *comminuted fracture.*

The last two forms do not often admit of successful treatment.

The *methods by which broken bones unite* are as follows:—

1. Under very favourable circumstances the broken ends may unite by simply becoming glued together by means of the reparative material deposited by the blood-vessels which ramify through the bone at the seat of injury. In order to bring about this desirable termination, we should endeavour to check the inflammation as much as possible, by giving rest, attending to the general health, etc., for when the blood-vessels, which supply the bone with the elements of repair, become inflamed, the circulation of blood in them is arrested, and they are, consequently, unable to repair the injury in a proper manner.

2. When circumstances or the nature of the part does not admit of the ready union of the bones in the way just described, a deposition of bony material takes place on the outside of the bones at the seat of fracture, so that the broken ends become firmly ensheathed, while, if the bone be hollow, a plug of bone is formed within the internal cavity which contains the marrow, so as to still further prevent movement. Rest being thus secured, the broken surfaces become gradually united by the deposition of bony material. When complete union has taken place, and all inflammation and increased reparative action have ceased, the external and internal bony deposits become absorbed after a few months.

3. When the blood-vessels fail, by reason of continued irritation, ill-health of the animal or other causes, to throw out bony material for cementing the bones together, union may be effected by means of a gristly

deposit, or *false joint.* I may remark that before that portion of the blood which is exuded from the vessels can become converted into bone, it must first be converted into cartilage (gristle); false joints, therefore, furnish us with an instance of bony repair being arrested in an intermediate stage.

Symptoms of fracture.—Sudden and great lameness; distortion of the part; a grating sound (crepitation) may be heard when the broken surfaces rub together; pain and fever. When there is fracture without displacement, there is often very little to show what is wrong as long as the animal is kept quiet. The symptoms are sometimes similar to those of violent sprain. Here the absence of injury to other parts will generally help us in our investigation.

Treatment of fractures.—If there be displacement, the bones should, if possible, be "set" without delay. The animal should have perfect rest, slings being employed if they can be obtained and if the nature of the injury admits of their use. All loose fragments of bone should be carefully removed. *Splints* may be employed to limit motion and to give support. They may be made of sole leather, gutta-percha, strong paste-board, or thin wood. Leather will require to be soaked in hot, and gutta-percha in moderately warm, water, to make them pliable. Before applying splints, the inequalities, which may be on the surface, should be filled up with tow or cotton wool, while the splints should be cut so as to prevent them from interfering with any prominences near the part, and also to keep exposed, for

treatment, any wound which may have been inflicted at the time of the accident. For a broken limb, it is well to use two splints, each being a little less in width than half the circumference of the part. We may then apply over the splints a starch bandage, which is a linen or cotton one dipped in a thick solution of starch. This bandage quickly dries, and then affords firm support to the limb. It may be easily removed by cutting it through, with a pair of scissors, at the space between the splints on either side. Instead of starch, common pitch or paste may be used. The limb may be fixed, without splints, by putting over it a thick coating of common pitch, or equal quantities of Burgundy pitch and beeswax, and applying a bandage in the same manner as when a "charge is put on." Great care should be taken that the bandage is not applied too tight at first, though at the same time it ought to afford firm support. The starch bandage can be easily readjusted. Splints need not be kept longer on than three weeks or a month.

Sawdust is a capital material for bedding, as it affords good foot-hold and allows the animal to readily change the position of his limbs.

A mild aperient, such as a pint of linseed oil, and laxative food—mashes, carrots, etc.—will be of service. If the animal suffers from extreme pain, we may give 3 drachms of opium, or 3 oz. of its tincture.

After a fracture of one of the limbs, a horse should not be taken out to exercise for at least two months and a half.

Period taken by the bones to unite.—The fractured

surfaces, as a rule, become firmly united in from three to four months, though, probably, three times that period has to elapse before the ensheathing material and bony plug become absorbed. Some permanent thickening usually remains.

Particular Fractures.

The most common fractures to which horses are liable are those of the *pastern bones;* the *point of the hip* (anterior iliac spine. See Fig. 4); and the *tibia* (the bone which lies between the hock and the stifle).

The most frequent fracture of all is probably that of the *pastern bones*, which are broken, generally, by the violent concussion of fast galloping, or from a diseased and brittle condition of the bone. This accident is termed *split pastern.* The animal pulls up extremely lame, the toe only being brought near the ground. The absence of injury to the tendons and ligaments is often the only sign by which we can guess at the nature of the accident. Sometimes the bone is broken into a great number of pieces, when, of course, treatment will be of no avail. As the ligaments are particularly numerous and strong about this part, and as its covering membrane is thick, this fracture frequently occurs without displacement, in which case we may expect a favourable termination. After two or three days the broken bone, when felt, gives one the impression that it is surrounded by a hard, thick covering (the

bony ensheathing material), which makes it of much greater circumference than the corresponding bone of the other leg, while the inequalities which one can feel on the surface of the latter, at the back of the pastern, are absent on that of the former. At first there is a great deal of sympathetic swelling, which rapidly goes down. Slings should be employed if procurable. The shoe should be carefully removed, and a thick bed of sawdust or black earth should be put down. Mr. A. Johnston, M.R.C.V.S., recommends that two or three weeks after the accident, the pastern should be blistered for the purpose of aiding the process of repair. He also states that there is difficulty in distinguishing between ringbone and the roughness resulting from this fracture.

The point of the hip is not unfrequently fractured by horses going through narrow doorways, or by falls. Owing to the movement of the strong muscles which are attached to the part, the fracture cannot be "set," a false joint being here the only method of repair. If this union fails to take place, the disconnected portion of bone should be cut down upon and removed, as it will act, if allowed to remain, as a foreign body in giving rise to inflammation. Although this accident causes an unsightly blemish when the horse is viewed from behind, still it does not appear to materially affect his usefulness.

The tibia is, on its inner surface, so unprotected that it is not uncommonly fractured by kicks from horses and from other injuries. Its covering membrane is,

however, so thick that often there is no displacement; hence, horse-owners should make it a rigid rule that if one of their animals gets kicked on the inside of the hind leg, just above the hock, he should not be worked for a few days until all fear of a fracture is removed. A thickening of the bone over the seat of injury will indicate the existence of reparative action. The animal should not be allowed to lie down, for if fracture without displacement exists, it will almost certainly be converted into a compound fracture on the horse endeavouring to get up. Slings, rest, and laxative foods are the best means of cure.

Superficial fractures of the *lower jaw* are sometimes caused by the injudicious use of severe bits and tight curb-chains. *Treatment.*—Remove any loose portion of bone; wash the part, a few times a day, with a solution of carbolic acid in water (1 to 40); give soft food; and avoid all pressure on the part.

Broken back generally occurs from falls and from the use of a "back rope" when casting a horse. When this accident occurs without displacement, recovery not unfrequently takes place. Hence, if, after a horse gets a fall, there be reason to suspect he has broken his back without displacement of the fractured ends of the bone, he should be kept lying down if already on the ground, or, if he has regained his legs, he should be put in slings so as to prevent him getting down. Except in obviously fatal cases, it is difficult to distinguish between this accident and severe strain of the psoæ muscles. (See page 53.)

The bones of the tail are sometimes broken by falls.

We should endeavour to "set" them, and should support the part by padding, and should apply, over the tail, a leather sheath (such as is used for horses when travelling by rail) which should be laced up to a moderate degree of tightness.

"*Broken ribs* are usually caused by kicks or collisions. Unless the lungs and pleuræ (the serous membrane between the ribs and the lungs) are penetrated by the broken ends, no bad results may be anticipated. Should the fractured ends wound the lung substance, we soon have the tissue between the skin and the part filled with air. This swelling is easily distinguished from effusion of serum or of blood, by its emitting a crackling sound when the hand is passed over it.

"These grave cases can seldom be treated successfully. I can hardly suggest any special treatment. It is bad practice to make an external opening for examination, as the air would rush in and out through the wound; for the same reason, should such a wound have been caused by the original accident, it must be closed without delay." (The foregoing remarks on "Broken ribs" were kindly communicated to me by Mr. A. Johnston, M.R.C.V.S.) Professor Williams recommends that when a compound fracture of this nature exists, the operator should introduce his finger into the wound, and should endeavour to convert it into a simple fracture, supposing of course that an external wound already exists. A broad belt may be employed to give support. If there be a wound with an external opening, it should be covered over, as recommended by Professor Williams, with lint or cotton rag soaked in a solution

of carbolic acid in water (1 to 40), in order to prevent putrefactive germs gaining access to the lung cavity, and exciting inflamation there.

It is not very uncommon to see horses with an abrupt depression over one of their ribs caused by a fracture on some previous occasion.

Pain evinced at the time of girthing up is sometimes the first indication of a broken rib.

CHAPTER VIII.

SYNOVIAL ENLARGEMENTS.

WINDGALLS—BOG SPAVIN—THOROUGHPIN—CAPPED KNEE.

Anatomy.—In order to diminish friction between certain structures, closed membranous sacs, containing an oily fluid called *synovia*, or (vulgarly) joint oil, are placed between them. As work causes an increased secretion of this fluid, we frequently find that, from its prolonged continuance, a chronic distended condition of these sacs ensues, with little or no inflammatory symptoms. Thus we have in bog spavin an enlargement of the synovial membrane which lines the capsular ligament of the true hock joint. In capped knee, we find distension of the synovial bursæ which facilitate the movement of the extensor tendon over the front of the knee, while in thoroughpin there is distension of the synovial sheath which allows the perforans tendon to glide smoothly over the os calcis. (See Fig. 3.) These instances afford us examples of the three actions respectively performed by the three classes of synovial membranes, viz., to line the capsular ligaments of joints ; to allow one surface to glide over another ; and to line a canal or sheath through which a tendon passes.

With the exception of capped knee, which is the result of injuries, these enlargements are, as a rule, signs of work in old horses, and of weakness in young ones.

In the great majority of cases, the superabundant synovia remains unchanged, while the animal suffers little or no inconvenience from its accumulation. But in some rare instances, the fluid becomes organized into fibrous tissue, which is hard and unyielding to the touch. I have seen a case similar to the one mentioned by Mr. Percivall, in which the process of organization in a windgall proceeded still further, so that it gradually became, during old age, converted into bone. I think horses in hot climates are more inclined to develop these enlargements than are those in cold or temperate countries.

As these diseases rarely affect the usefulness of the animal, they should not, as a rule, be interfered with.

General Treatment.—If heat and inflammation be present, apply warm fomentations; put the horse on laxative food, and give a purgative if necessary. When applicable, employ a high-heeled shoe in order to throw the part into a state of rest. After the inflammation has subsided, apply pressure by means of bandages, whose effect may be assisted by pads of tow or other material judiciously placed. Trusses made specially for the reduction of bog spavins and thoroughpins may be employed. The continued application of the compound tincture of iodine, rubbed in twice a day, has been found to be of service in some cases. Blisters and rest

may cause absorption for the time being, but the distension will generally reappear as bad as ever on the resumption of work.

Windgalls

May be said to be a distended condition of the synovial sacs of the fetlock. They appear in the form of soft puffy swellings, which may vary in magnitude from the size of a pea to that of a hen's egg, or even larger.

Anatomy.—The usual positions they occupy are as follows :—1. In the space between the branches of the suspensory ligament and the perforans tendon ; this is their usual site. 2. "In the interval between the perforatus and perforans tendons, about two inches above the sesamoid bones ; indeed, the sac of the windgall, from surrounding attachments to its borders, appears as though it gave passage to the perforans tendon through its cavity ; though this appearance, in point of fact, is owing to the membrane of the bursa being reflected upon the surface of the tendon." (*Percivall.*) (See Fig. 1.) 3. In front of the fetlock under the tendon which extends the foot. 4. As mentioned by Mr. Percivall, in front of the fetlock, but between the extensor tendon and the skin. 5. Between the sesamoid bones and the perforans tendon. In this latter form, as the distended sac cannot, owing to the pressure of the perforans tendon, bulge backwards, it appears as a puffy swelling at both sides of the back of the fetlock, constituting what we may term *thoroughpin of the fetlock.* If, as pointed out by Professor Williams, we find that this enlargement is soft and yielding, we

may regard it as of little consequence; but if it feels tense, although it may fluctuate on pressure, we may deem its presence to be owing to inflammation of this synovial sac; a condition which constitutes a most intractable disease (sesamoiditis), and which causes a most grave unsoundness whether the horse goes lame or not, for although the lameness may disappear with rest, it will return as soon as the horse is put to work

Treatment.—Although windgalls are of little consequence, still, to prevent their further development, we may, with advantage, try the effect of the continued application of a wet bandage to the part, with a tight flannel bandage over it, so as to afford pressure. Rest and blisters will remove windgalls, but only for the time being, as they will again appear as soon as the animal recommences work.

Bog Spavin

Appears as a soft swelling in front and to the inner side of the hock joint.

Anatomy.—It is a distended condition of the synovial membrane of the capsular ligament of the true hock joint—that which is formed by the tibia and astragalus; it is situated on the inner side of the hock, higher up and more in front than the seat of bone spavin, lying between the base of the astragalus and the internal lateral prominence (the malleolus) of the tibia. (See

Fig. 11.) "It shows itself at the inner side of the joint, because here the ligaments are wider apart, and there is more room for distension." (*Stonehenge.*) It is soft and elastic, and extends up and down the inner front of the joint for about three or four inches.

Bog spavins sometimes come on as a simple over-supply of synovia, without any symptoms of inflammation; while in other cases the distension, at first, is hard, painful to the touch, and accompanied with more or less lameness, indicating, as a rule, sprain, or other injury, of some of the underlying structures. In the former instance, the affection seldom impairs the usefulness of the animal, and is generally the effect of premature over-work, or of a defective shape of the joints. In the latter, the ailment is an undoubted unsoundness.

In some cases the disease is caused by rheumatism; its consequences are then most serious, as that disease causes structural changes in the affected parts.

As hereditary predisposition is well marked in bog spavin, breeders should be careful not to use animals suffering from it for stud purposes.

Thoroughpins usually accompany large bog spavins.

See "General Treatment," page 210.

Thoroughpin

Appears as a swelling at the back of the hind leg, just above the point of the hock, and in front of the tendons (the hamstring) which are attached to that part. When pressed with the finger at one side of the

limb, it will bulge out with increased prominence on the other side. Hence the name. (See Fig. 3.)

Anatomy.—It is a distended condition of the synovial sheath of the perforans tendon as it passes over the os calcis. The sac thus formed is pushed up into the space between the perforans tendon and the tendo-Achillis, a name given to the two tendons which pass down to the point of the hock. (See Fig. 3.)

See "General Treatment," page 210.

Capped Knee

Is a distended condition of one or both of the synovial bursæ of the tendon (extensor metacarpi magnus) which passes over the front of the knee. It is usually caused by blows. It may also occur, especially when hunting or steeplechasing, from a thorn puncturing the tendon which plays over the bag containing the joint oil. When this accident happens, inflammation is set up in the tendon, and an increased supply of blood is drawn to the part, the synovial sacs becoming thereby stimulated, and consequently distended with fluid.

Capped knee is of very little consequence when it is simply a distended condition of the synovial sacs, but if the tendon be also affected, it is a serious complaint, and will be accompanied with more or less lameness.

Treatment.—If the case does not yield to the effects of rest and bathing with warm water, we may rub into the part, with a certain amount of friction, tincture of iodine two or three times a day. If the swelling still continues, we may blister it with the biniodide of mer-

cury (1 to 16 of lard). The synovia in the distended sac may then become absorbed on undergoing a further change. If, after a blister or two, the swelling still remains soft, it may be opened, at its lowest point, by making a small horizontal incision. A firm bandage should be applied over the empty sac, whose orifice should be kept open for a short time by means of a small piece of lint or cotton, so that any remaining fluid may drain off. The object of the bandage is to cause the walls of the sac to unite together.

CHAPTER IX.

Serous Abscesses.

CAPPED HOCK—CAPPED ELBOW.

Serum, which is the fluid we find on opening a blister, often accumulates at the point of the hock, or at the back of the elbow, causing these parts to become "capped," as a result of injury. Unlike synovia, serum generally becomes quickly organized into a low form of fibrous tissue.

These enlargements, though unsightly, rarely cause uneasiness to the horse; they may, however, be treated boldly by surgical means, as they are well removed from any important structures.

Capped Hock

Is a serous abscess situated at the point of the hock, between the cap of the perforatus tendon and the skin. (See Fig. 3.) It is usually caused by kicking. It is not an unsoundness.

Treatment.—When the injury is recent, warm fomentations should be applied to the part. If an attempt is to be made to reduce the tumour—which should not be done until all heat and inflammation have subsided—a seton, which should be allowed to remain in not longer than ten days or a fortnight, may be passed through its centre; or the part may be stimulated from time to

time, with the biniodide of mercury ointment (1 to 30 of lard).

Capped Elbow

Is a serous abscess situated behind the elbow joint, and is caused by the part being hurt by the heels of the shoe pressing upon it when the horse is lying down.

It rarely causes lameness.

We may generally arrest its development if we treat it properly in its earliest stage. With this object in view, remove the shoe, or get the horse shod with short shoes, and at night cover the heels with some soft material, such as felt, so that they may not hurt the elbow; or tie him up. Use continued fomentations of warm water for a few days, and after that rub in for a considerable time every day, for a fortnight or so, the following liniment—

Soap liniment	- - - -	$\frac{1}{4}$ pint.
Strong liquor ammoniæ	- -	$\frac{1}{2}$ drachm.

The pressure caused by the rubbing and the stimulating effect of the liniment will generally make the tumour disappear.

If the abscess does not yield to these simple means, we may pass a seton through its centre in a vertical direction, and allow it to remain in for not longer than ten days or a fortnight. If it is already hard and fibrous, we may safely remove it with the knife. To accomplish this, make a long vertical incision through the skin, and then carefully dissect the tumour out. The application of cold water and any astringent lotion will constitute all the after treatment required.

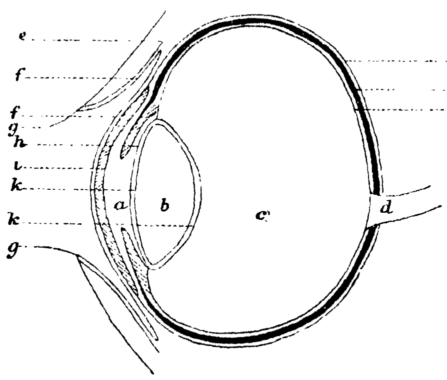
CHAPTER X.

Diseases of the Eye.

SKETCH OF THE ANATOMY OF THE EYE—SIMPLE OPHTHALMIA—PERIODIC OPHTHALMIA, OR MOON BLINDNESS—CATARACT—WORM IN THE EYE—AMAUROSIS, OR GLASS EYE.

Diagram of a Section of the Eye.

Fig. 13.



The iris and cornea are shaded.

Sketch of the Anatomy of the Eye.

The surface of the eye and the inside of the eyelids are covered by the *conjunctiva* (see *f*, Fig. 13), a delicate mucous membrane.

The front of the wall of the eyeball is formed of a strong transparent covering (*i*), the *cornea* (Fig. 13), which is somewhat of the form of a small watch-glass, while the remainder consists of a strong fibrous coat, the *sclerotic* (*l*), which is lined by a dark membrane, the *choroid* (*m*). Behind the cornea, and attached to the choroid, hangs a thin contractile curtain termed the *iris* (*h*), through the centre of which there is an elliptical opening known as the *pupil of the eye.*

The anterior portion of the sclerotic lies immediately under the so-called *white of the eye*, which is the expansion of the tendons of certain muscles. We may regard the cornea as the continuation of the sclerotic, and the iris as that of the choroid.

"Two sets of fibres enter into the formation of the iris, one of which, converging from the circumference towards the centre, has the power of dilating the pupil; the other, surrounding the margin of the pupil on its posterior surface, and blending with the radiating fibres, has the power of contracting it." (*Strangeways.*) The distinctive colour of the eye is derived from that of the iris, which "is variously coloured, but in the horse is brown, with more or less of a yellow tinge; sometimes, however, it is almost white or grey, when the animal is said to be 'wall-eyed'." (*Strangeways.*) Behind the iris, which is slightly convex, and suspended from the choroid, is a biconvex, transparent, solid body—*the crystalline lens* (*b*)—which is compared by Chauveau to a rose diamond. This lens divides the eye into two compartments,—the anterior, which is partially divided by the iris, and filled by a watery fluid called the *aqueous humour* (*a*); and the

posterior, which holds a very similar, but denser, liquid —the *vitreous humour* (*c*).

The crystalline lens is covered by a transparent membrane called the *capsule* (*k*).

The *optic nerve* (*d*) proceeding from the brain enters the eyeball at its posterior part, and pierces the sclerotic and choroid; it then, by its expansion, forms a membrane, the *retina* (*n*), which lines the choroid, and terminates at the circumference of the crystalline lens. When rays of light, coming from any object, fall on the eye, they enter through the pupil, and, becoming refracted by the crystalline lens, are thrown on the retina, which conveys, through the optic nerve and thence to the brain, a correct impression of the object seen. The choroid is dark-coloured, so as to enable it to absorb any superfluous rays, while the pupil has the power of contracting and dilating in order to regulate the admittance of light.

Simple Ophthalmia

Is inflammation of the membrane (the conjunctiva) which covers the surface of the eye, and lines the eyelids. It usually occurs from injuries, or from the presence of a foreign and irritating body. It may accompany catarrh, influenza, &c. It never comes on as a distinct disease of itself, thus differing from periodic ophthalmia, which is a constitutional disease.

When it is caused by a blow directly inflicted on the

cornea, the opacity radiates from the point struck. This appearance, which will serve to distinguish the affection from that due to cold, will not be present when the eye has been injured at a moment when it was protected by the eyelid. In this last-mentioned case, there will often be a mark of the injury on the skin which covers the eye. "In catarrhal inflammations of the eyes, the opacity converges inwards from the margin of the cornea." (*Williams.*)

Symptoms.—The eye has the appearance of having received a blow. The eyelids are closed and swollen. The eyeball is retracted. Tears flow copiously. The haw projects, and there is great intolerance of light. The conjunctiva is red and congested. The cornea gradually becomes clouded, while the opacity appears to be superficial and of a bluish colour, characteristics which distinguish this inflammation from periodic ophthalmia.

Treatment.—Examine the part to see if there be any external injury; if a foreign body be found in the eye, remove it with caution. To do this we may have to draw back the haw (membrana nictitans) by transfixing it with a needle and thread. Give a dose of physic, and keep the animal on laxative food. Foment the part with warm water, and keep the horse in darkness. Smear, from time to time, the skin round the eyelids with the extract of belladonna, which may be made to adhere by mixing it with a little gum. The belladonna relieves the congestion of the blood-vessels by causing their muscular coats to contract. If the eye remains weak, it may be stimulated by the application of—

Sulphate of zinc - -	3 grains.
Or, alum - - -	6 ,,
Or, nitrate of silver -	2 ,,
Water - - - -	1 oz. (Gamgee).

On no account should any salt of lead be used to the eye, as it would be apt to cause opacity of the cornea, by the lead forming a white and insoluble albuminate with the albumen of the part.

Cloudiness of the Cornea.—If, after the acute stage has passed, any opacity of the cornea remains, apply two or three times a day, as recommended by Dr. Lawson for human patients, oil of turpentine, 1 part, olive oil, 7 parts.

Periodic Ophthalmia or Moon Blindness.

This is happily now a very rare disease.

It is induced by bad sanitary arrangements; by hereditary predisposition; and, according to Mr. Percivall, by the injurious influences of wet, marshy pastures on which horses have been reared. Using for stud purposes stallions whose eyes were affected was formerly a frequent cause of blindness among Irish horses. This disease appears to be an inflammation of the whole structure of the eye, while in simple ophthalmia only the membrane which covers the eye is affected. It is generally confined to one optic. The symptoms come on suddenly, and resemble those of simple ophthalmia, except that the interior of the eye becomes changed in colour, and of a dim, dull appearance, while the cornea becomes clouded.

In the other affection the inflammation is confined to the surface of the eye.

The intensity of the symptoms usually begins to abate after about a week, and the cornea and conjunctiva gradually assume, more or less, their normal condition. Mr. Gamgee observes that "the first attacks are usually the longest, and their duration diminishes, as a rule, with their recurrence. During the progress of apparent recovery a relapse is not unfrequent, and the term may be thus indefinitely lengthened. The interval between the attacks is, on an average, about sixty days. The eye may seem quite clear during the intermission; but it has not returned to its normal condition. The outline of the upper eyelid is usually altered. It presents a slight bend in its internal part, so that the upper joins the lower lid, at the inner angle, by a right in place of an acute angle. This is best marked after several severe attacks, and gives a triangular outline to the opening between the lids."

Professor Williams notes the peculiar wrinkled or furrowed appearance which the upper lid and eyebrow assume.

The eye appears smaller than natural, and looks dull and weak. In confirmed cases the haw is prominent, the cornea more or less opaque, and the iris changed in colour.

These indications may be of use to an intending purchaser.

This disease usually terminates in cataract, although the latter affection may come on independently of the former.

Cataract

Is an opaque condition of the crystalline lens of the eye, or of its capsule, or of both structures at the same time, by reason of which the light which enters the pupil is unable to pass on to the retina, blindness being the natural result. A cataract may consist of only a small white or bluish-white spot which but partially obscures the vision, and it may then be the cause of shying in the animal; or it may completely cover the affected structures. In the former case, if the horse be taken into a dark room and the eye be examined by the light of a candle, the speck may be seen through the pupil, which will, more or less perfectly, contract or dilate on the approach or removal of the taper; while in the latter, the cataract will appear like a white curtain drawn across the opening of the pupil, which is now totally insensible to the action of light.

A careful comparison of the behaviour of both eyes under the influence of the light of a candle in a room, in which there is no other source of light, will aid the correctness of the examination.

White specks on the cornea should not be confounded with cataract.

An examination of the eyes in daylight is very apt to lead an inexperienced observer into error, owing to the fact that light reflected into the eye from white objects, such as white-washed walls, white clothing, &c., causes the formation of white images within the interior of the eye.

The presence of cataract is best tested—under ordinary circumstances—by holding upright a lighted candle in front of the suspected eye, in which, if it be healthy, three vertical reflections of the candle will be seen, one on the cornea, a second on the front of the crystalline lens, and a third, turned upside down, on the back of the lens. The inverted position of the last-mentioned image is due to the fact that the rays of light become refracted on passing through the lens. If the candle be gently moved from right to left, the first and second images will move in the same way, while the third will go from left to right, and *vice versâ*. When the cataract is complete, it will naturally prevent the formation of the third image.

In human practice, an eye suffering from cataract may be operated upon by cutting through the cornea and boldly removing the crystalline lens. The eye will, after this, require the aid of glasses in order to bring the rays of light into focus. But as spectacles cannot be properly adjusted to the eyes of horses, the operation for cataract is very rarely tried on them.

Worm in the Eye.

This disease is hardly ever met with except in India, in some districts of which country it is not of unfrequent occurrence. It consists in the appearance of a thin, thread-like worm in the aqueous humour of the horse's eye. The parasite varies from about half to one inch in length. Dr. Cobbold (*Veterinarian*, November, 1874) states that they are of two kinds, viz., the *Filaria papillosa*, the large,

and the *Spiroptera lachrymalis*, the small variety. These worms are met with in various parts of the internal organs, blood-vessels, &c., as well as in the eye, and "find their way into the animal's body along with the water he drinks, either as fully-developed parasites or as ova (eggs). Both the parasites and their eggs are abundantly found in the stagnant waters of India." (*Williams.*)

The first symptom of the presence of the worm is a slight opacity or milkiness of the cornea, due to inflammation; beneath this opacity the worm may be observed moving about. Simple ophthalmia may be distinguished from "worm in the eye" by means of the inflamed appearance of the eyelid, which is its first symptom, and which naturally is absent in the disease we are at present describing. No time should now be lost in operating, for if the worm be left undisturbed, the inflammation of the cornea will proceed, and the animal will probably lose its sight in a short time. The removal of the worm may be effected by puncturing the cornea with a lancet or sharp penknife, the point being guarded by thread wrapped round the blade, leaving about a quarter of an inch of the point bare. As the cornea is hard, a bold, sharp stab should be given. The puncture should be made obliquely, and close to where the cornea joins the white of the eye, and on the outer margin; obliquely to avoid wounding the iris, and also to allow of the ready apposition of the edges of the wound; and close to the line of union of the cornea and sclerotica, so that the worm may more readily escape. The outer portion of the cornea is more easily operated upon than

the inner. Before making the puncture, the operator should wait till he finds the worm in a position that will facilitate its escape on the fluid squirting out. To aid this, at the time of operating, he might press the upper part of the eyeball with his left hand. The operation may be done standing, when a twitch should be employed to keep the animal quiet. If possible, it should not be done without the aid of chloroform. In the majority of cases the worm seems to be anxious to quit the eye, as he will generally make his escape if the aperture be big enough, even if he be not drawn through by the first rush of fluid.

The subsequent treatment may consist in shading the eye from light, and applying cold water, or a mild astringent, such as any one of the applications recommended for simple ophthalmia.

Horses affected with worm in the eye should be liberally fed, and should get tonics, such as ½ drachm of sulphate of iron, twice a day, in the food, and a couple of quarts of beer a day to drink. Following the teaching of Dr. Neligan, we use these means to correct the peculiar condition of the system which favours the development of these parasites.

Amaurosis or Glass Eye

Is a condition of the eye in which there is loss of function of the optic nerve, which renders the retina insensible to the action of light. It may be due either to disease of this nerve, or to sympathetic causes : if owing

to the former, it is incurable; if to the latter, it will disappear as the original disease is relieved.

In the great majority of cases, both eyes are affected. The presence of the disease may be known by the fact of the pupil remaining dilated and immovable under the influence of light, while the interior of the eye looks bright, healthy, and somewhat clearer than natural—in fact, it looks glassy; hence its common name. The eyelids are opened wide; and when both eyes are affected, the animal's action and appearance denote that he is blind.

As remarked by Professor Williams, if one eye only be diseased, its pupil will contract when light falls on the sound eye; but if the blind eye be alone subjected to the influence of light, neither its own pupil nor that of the healthy organ will contract. The influence which the sound eye has on the blind one is owing to the distribution of the optic nerve fibres; there being a nervous connection between the two eyes, as well as between each eye and the opposite nerve root. But that portion of the nerve which proceeds from the blind eye to the brain, having lost its function, is unable to influence the healthy optic.

CHAPTER XI.

DISEASES OF THE ORGANS OF BREATHING.

SKETCH OF THE ANATOMY OF THE ORGANS OF BREATHING—PNEUMONIA, PLEURISY, BRONCHITIS AND CHEST INFLUENZA—GENERAL TREATMENT—CONGESTION OF THE LUNGS—SORE THROAT—CATARRH OR COLD IN THE HEAD—SIMPLE COUGH—CHRONIC COUGH—ASTHMA OR BROKEN WIND—ROARING AND WHISTLING—THICK WIND—HIGH-BLOWING—STRANGLES.

Sketch of the Anatomy of the Organs of Breathing.

THE nasal passages open into a cavity called the *pharynx*, which also communicates with the mouth through an opening called the *isthmus*, over which the soft palate is suspended, as a valvular curtain, in order to keep it shut, except during the passage of food or water; hence the horse is unable to breathe through his mouth. The windpipe, or *trachea*, opens into the pharynx by means of a short cartilaginous tube, the *larynx*, which is the organ of voice. It is situated at the back part of the space between the lower jaws. When it is inflamed we have *laryngitis*, or sore throat. The larynx is guarded from the entrance of food, water, &c., by a cartilaginous valve called the *epiglottis*, over which the mouthful of food, or "go-down" of water, passes. The windpipe, or *trachea*, is an elastic tube

formed of incomplete cartilaginous rings; it terminates at the base of the heart and splits up into two tubes—the right and left bronchi—which respectively go to the right and left lung. These bronchi further subdivide into a great number of branches called the *bronchia*, or *bronchial tubes*, which finally open into the air-cells of the lungs. "The entire ramification when isolated has the appearance of a tree, the trachea being the main trunk, the bronchi and bronchial tubes the branches, and the air-cells the leaves." (Strangeways' Anatomy.) The nasal passages, the pharynx, larynx, and bronchial tubes are lined with mucous membrane. Thus in sore throat and bronchitis (inflammation of the bronchial tubes), we have at first a dry and inflamed condition of this mucous membrane succeeded by an increased secretion of phlegm (mucus).

The mucous membrane is what we may call the internal skin which lines the various hollow organs, such as the air-passages, mouth, gullet, stomach, intestines, eyelids, interior of the ears, genital and urinary organs; it secretes *mucus* which corresponds to the cuticle given off by the skin.

The lungs are composed of a spongy substance, which is made up of a vast number of small lobules that are connected together by cellular tissue. Each of these lobules is complete in itself, and is supplied with a small bronchial tube, which conveys air to the minute air-cells. The capillary blood-vessels "are so arranged between the two layers forming the walls of two adjacent cells, as to expose one of their surfaces to each in order to secure the influence of the air upon them." (*Fleming.*) The blood thus brought into extremely

close proximity with the air contained in the cells while traversing their walls takes up the necessary supply of oxygen for the requirements of the system, and, on its return to the lungs, gives off the carbonic acid which it absorbed from the various tissues. The skin, to a certain extent, also excretes carbonic acid.

The *pleuræ* are two smooth and glistening membranes which line the cavity of the chest and cover the lungs, thus forming two closed sacs; their office being to prevent friction between the lungs and the walls of the chest. They secrete *serum*—the watery fluid contained in a blister—with which to lubricate their inner surfaces.

Pneumonia, Pleurisy, Bronchitis, and Chest Influenza.

When the *pleuræ* become attacked by inflammation, they become dry during the first stage; hence, the observer, on applying his ear to the sides, may then distinguish the disease on hearing the characteristic dry, crackling friction sound emitted from the cavity of the chest during the early stages of pleurisy (inflammation of the pleuræ), the lungs being in a constant state of movement inside the chest. Owing to the pleuræ forming closed sacs, we always have, after an attack of pleurisy, a greater or less effusion of serum into them, constituting "water on the chest."

As the pleuræ are most intimately connected with the lungs, we rarely have one structure affected by inflammation without the other also becoming implicated.

The mucous membrane which lines the bronchial tubes is not continued into the air-cells; hence bronchitis often occurs without the lungs being involved,

and pneumonia, without the inflammation extending to the bronchial tubes.

The general treatment of these diseases, whether in a simple or combined form, is so similar that there is a little to be gained, even if it were practicable, by detailing a separate line of treatment for each of these ailments. Hence I have included them under one broad heading.

Their usual cause is exposure to cold and chill.

Generally, in these chest complaints, the horse refuses to lie down; the bowels are costive; the dung mixed with flakes of mucus, which indicates irritation of the intestines, and the non-administration of aperients, which, if given, would still further add to the existing irritation, and might induce fatal consequences; while the rate of breathing (the natural rate is about 12 or 13 per minute) is increased.

"Respiration in the horse is more regular than in the other animals, and an increase in rate of breathing, when the animal is at rest, always indicates some derangement; at the same time the careful examiner, even in the case of the horse, pays more attention to the peculiarity of the respiratory action than to the frequency of the act."—(*The Field.*)

I will briefly describe the respective symptoms of pneumonia, pleurisy, bronchitis, and chest influenza, occurring in a simple form; then remark on the symptoms presented in complicated cases, and finally give the general treatment, with such special directions as the symptoms may indicate.

In these chest disorders, an unprofessional observer will often be unable readily to detect the disease in its

first stage, the horse at the outset usually appearing to him to be simply dull and out of sorts; for this reason, the attack will have usually run a part of its course before its existence be suspected.

One should remember that these diseases, in their first or inflammatory stage, run a regular course which terminates in the exudation of lymph, which is the watery and colourless portion of the blood. The inflammatory or fever stage lasts about a week, more or less.

Professor Williams remarks respecting inflammation of the lungs:—"It will be seen that pneumonia is dangerous during two stages: first, during the early fever, which may destroy life by its intensity; and secondly, during the period of lung hepatization [consolidation into a substance resembling liver], which may prove fatal by so altering the lung tissue as to produce suffocation."

In pleurisy there is, during the second stage, an exudation of lymph, which becomes more or less organized on the pleuræ, and also an effusion of serum (the pleuræ being serous membranes) into the cavity of the chest, forming water on the chest, or hydrothorax. In bronchitis, the exudation forms inside the bronchial tubes, and often, on becoming organized, causes obstruction to the air breathed, as indicated by the animal "making a noise," or by his becoming thick winded; infiltration may also take place into the substance of the lung, causing it to become solidified, with consequent loss of function in the part implicated.

Symptoms of Inflammation of the Lungs.—Dulness and depression of spirits. Fever. Acceleration of the

pulse, often over 80 per minute (natural number being about 38). Pulse sometimes hard and bounding, sometime weak and oppressed. Breathing soon becomes much quickened, being sometimes over 40 per minute (natural rate when at rest being about 12 or 13), but without marked pain, unless when the disease is complicated by pleurisy. The cough, if it be present, is full and strong, and very unlike the suppressed painful one of pleurisy. The mucous membranes of the nostrils (the Schneiderian) and that of the eyelids (the conjunctiva) are red and congested. Fine blood-vessels in a red and congested state may be seen on the outer edge of the membrane (the conjunctiva) which covers the white of the eye, giving it a bloodshot appearance. Internal temperature about 104° F., natural temperature being about 100·5° F. If the ear be applied to the side, there is no very clearly defined unnatural sound, except that of quickened breathing. If the attack be but slight, the exudation may become absorbed, and the lungs may recover their healthy tone without further change.

If the horse does not succumb during the first stage of the disorder, the fever gradually subsides; the pulse falls; the temperature of the mouth and body becomes lower; the appetite returns; and the urine, before scanty, is now abundant. The rate of breathing, which had decreased with the abatement of the fever, now increases in rapidity, owing to a consolidation of a portion of the lung, thereby leaving a diminished amount of that organ with which to perform its function.

Symptoms of Pleurisy.—Pleurisy generally attacks only one side of the chest, that being the right in most

cases. At first the symptoms usually resemble those of colic, except that the pain is constant and not intermitting. The horse shows a great disinclination to move. There is considerable distress. In mild cases the colicky pains are often absent, while a shivering fit precedes the disease. The affected side is tender to the touch. The breathing is quick and imperfect, while the flanks heave, which shows that the animal endeavours to breathe as much as possible by the action of the muscles of his abdomen, and not by the movement of his ribs, which are in close proximity to the inflamed pleuræ. The nostrils are dilated. There is usually a dry, short cough present, which is repressed by the animal, so as not to shake the inflamed parts. Often, during expiration, the horse gives a painful grunt, especially when he is made to move. The pulse is generally hard and quick, or it may be weak and oppressed, and not much quicker than usual. If the ear be applied to the affected side, a dry crackling or friction sound may be heard, as if two dry pieces of bladder were rubbed together: this is owing to the dry and inflamed pleuræ (which line the cavity of the chest and cover the lungs) rubbing together during the act of breathing.

We may say that the three characteristic signs by which pleurisy, in its acute stage, may be recognised are—the peculiar friction sound heard on applying the ear to the affected side; the short, dry, painful, and suppressed cough; and the abdominal breathing, made evident by the existence of a groove between the false ribs and the abdomen in the direction of the so-called hip-bone (anterior iliac spine).

In the second stage, the fever abates and the pain decreases; if there has been a considerable effusion of serum (causing hydrothorax or dropsy of the chest) the breathing becomes accelerated, owing to the mechanical impediment offered by the serum to the expansion of the lungs; "the pulse small, quick, soft, often intermitting; auscultation [observing the sounds given by the chest on applying the ear to the side] reveals absence of sound in the inferior part of the chest, or a sound resembling that of drops of water falling into a well." (*Williams.*) Dulness of the lower portion of the chest, which contains serum, may be observed on tapping the part with the tips of the fingers.

Symptoms of Bronchitis.—Hoarse, painful cough, which is dry at first, but subsequently moist. This cough is not short and suppressed as in pleurisy. The breathing is hurried and the pulse rapid. The lining membrane of the nostrils and eyelids are red and appear filled with blood. The animal is dull and listless. At first the saliva is thick and ropy. As the disease advances there is a profuse discharge from the nose. If the ear be applied to the side, the sound of the rapid passage of air through the inflamed air-tubes—which become consequently reduced in size —may be perceived.

Chest Influenza.—Under this convenient but ill-defined term I wish to class affections of the lungs, pleuræ, and bronchial tubes, which occur in various forms, but are generally to be distinguished by their epidemic character. (See Chapter on "Constitutional Diseases.")

N.B.—The liver is frequently implicated in an attack of the chest diseases under consideration, as will be indicated by the yellow colour of the gums and lining membrane of the eyelids. The practitioner should neglect these secondary symptoms, and attend solely to the alleviation of the original disorder, resting assured that as it subsides, so will the symptoms of derangement of the liver gradually disappear.

General Treatment for Inflammation of the Lungs, Pleurisy, Bronchitis, and Chest Influenza.

Theory of Treatment.—In no department of either human or veterinary medical science has the progress of knowledge been better marked than in the treatment of lung diseases. Dr. Bennett on the one hand, and Professor Williams on the other, have respectively demonstrated that these affections very rarely indeed prove fatal, when treated according to the rational method, which is indicated in the proposition laid down by the former author in his "Clinical Lectures," viz., "That an inflammation once established cannot be cut short, and that the object of judicious medical treatment is to conduct it to a favourable termination."

After detailing the success which attended his line of practice, Dr. Bennett remarks, "From these facts it follows that uncomplicated pneumonia, especially in young and vigorous constitutions, almost always gets well, if, instead of being lowered, the vital powers are supported, and the excretion of effete products assisted.

It is exactly in these cases, however, that we were formerly enjoined to bleed most copiously, and that our systematic works even now direct us to draw blood largely and repeatedly in consequence of the supposed imminent danger of suppuration destroying the texture of the lung. Such danger is altogether illusory, and the destruction to lung tissue, so far from being prevented, is far more likely to be produced by the practice." In continuation, the same author states, "I think it has been further shown that in recent times our success in treatment has been great, just in proportion as we have abandoned heroic remedies, and directed our attention to furthering the natural progress of the disease."

I have given the foregoing extracts from Dr. Bennett's work because they indicate most appropriately the treatment we should adopt towards our patients, and which is the one taught and practised by Professor Williams with most marked success for many years. In fact, I may say that the mortality suffered by horses treated by him for these diseases, has been under one per cent.

Although the practices of blistering the chest and sides, bleeding, and giving purgatives, in the acute stages of chest diseases, are fraught with the most disastrous consequences, as well as being utterly opposed to all sound teaching, still they are so often employed, even by veterinary surgeons, that it may not be without benefit if I briefly allude to the reasons against employing such measures.

In the acute stage of all inflammatory diseases, there is a great rise in the temperature of the body, which

causes an increased waste; while from loss of appetite, the animal will take little or no nourishment, nor, even if it be forced on him, can his system assimilate it; hence there is imminent danger of his sinking from exhaustion before the disease runs its course.

As the skin of the chest and sides of the horse is very sensitive, is highly endowed with the power of movement, and is covered with hair, blisters applied to it produce great irritation, and a most marked rise in the temperature of the body. In fact, by employing them, we but fan the fire which is consuming the animal.

By bleeding, we weaken the vital powers, which can ill sustain the slightest impairment at a time when they are so severely strained.

In the diseases under notice there is inflammation of the mucous membrane of the air passages, or of structures in close connection with it. As the mucous membrane of the intestines is continuous with that of the air passages, and as there is intimate sympathy between the various portions of both surfaces, it follows that if a purgative, whose action is to set up irritation in the intestines, be given to a horse suffering from any chest disease, the chances are that it will seriously, if not fatally, aggravate the complaint.

As the blood is the vehicle by means of which the waste materials of the body are removed, it becomes loaded with them, during inflammatory diseases, owing to the rise in temperature. When the blood is in this state, the various organs of breathing are unable to perform their respective functions with their natural facility, and as the presence of inflammation also

impedes the function of a part, it follows that we should direct our efforts, in these diseases, to maintain the purity of the blood. Hence, we allow a free supply of fresh air for furnishing oxygen to the lungs; we clothe the animal warmly and apply warm fomentations to encourage excretion from the skin; we give, to a moderate extent, diuretics, such as nitre, and sweet spirits of nitre, to act on the kidneys, a full supply of pure drinking water, to dilute the blood mass, and laxative food to act gently on the bowels.

We should keep up the strength by suitable food, and slight stimulants judiciously given.

We may give—but only then as a choice between two evils—opium to soothe pain, and aconite to moderate the action of the heart.

Every means should be taken to avoid exciting the animal, for excitement will be followed by an increase in the rate of the beats of the heart, and a consequent strain on the inflamed organs.

Practical Treatment.—The horse should be kept in a large, comfortable box, well ventilated, but free from draughts. If the bowels be costive give an enema of warm water. Foment the sides with warm water for a couple of hours, dry them, and, in order to prevent the part becoming chilled, rub in the following liniment:—

Soap liniment	- - -	½ pint.
Strong liquor ammoniæ	-	1 drachm.

The fomentation may be arranged by soaking a blanket in hot water, wringing it moderately dry, placing

it over the back and sides, and then covering it over with a waterproof sheet, or dry blanket. Before the first blanket is removed, a second one should be got ready, and so on. The water should not be so hot as to inflame the skin, for a soothing, not an irritating effect, should be the desired object.

After the fomentations are finished, clothe warmly, so that the skin may act. Hand-rub the legs well, rub in some of the soap liniment, and put on straw or flannel bandages to reach well above the knees and hocks. Give the animal plenty of cold water to drink. Keep him quiet. Let the food consist of gruel, bran and linseed mashes, scalded carrots, hay, and some green grass or lucerne. Give an ounce of nitre the first day, and half an ounce in a mash, or in the water, on the following days, stopping it when the urine becomes abundant. Drenching should, if possible, be avoided, on account of its distressing the horse.

Professor Williams in his lectures strongly advises that, beyond the means I have detailed, the practitioner should do nothing, if he is not absolutely certain that the course he is about to pursue is the right one; that in cases of doubt it is well to wait and to watch symptoms, and that, if leaving the case to nature acts well, the animal should not be interfered with.

In these diseases good nursing is the main thing, the administration of medicine being but of secondary importance.

If, in the *early stages* of the attack, the pulse be very quick and bounding (hard and full), give—

Fleming's tincture of aconite -	10 drops.
Water - - - - - -	1 pint.

The aconite may be repeated once or twice in doses of 6 or 7 drops at intervals of four or five hours, if the pulse does not become softer. Unless the practitioner is sufficiently experienced to accurately distinguish the nature of the pulse, he should on no account employ aconite, as it has a debilitating effect on the system, owing to its sedative action on the heart. If the pulse be oppressed or weak, though quick, aconite should not be given, for here we have debility clearly indicated.

When the pulse loses its hard character, give daily two drachms of carbonate of ammonia divided between three drenches, with a pint of water to each. If the horse will not eat, add two drachms of nitre to each drench instead of giving it in the food. The carbonate of ammonia strengthens the action of the heart, lowers the temperature of the body, and by its alkalinity tends to preserve the fluidity of the blood. If the carbonate of ammonia be not at hand, give an ounce of sweet spirits of nitre twice a day.

If symptoms of pleurisy be well marked and the pain be very acute, give—

Tincture of opium - - -	2 oz.
Linseed oil - - - -	½ pint.

If the symptoms of pain continue to be very urgent, 1½ oz. of the tincture of opium may be subsequently given in a pint of water.

If, on the contrary, the symptoms of bronchitis be manifest, give in a ball—

Carbonate of ammonia - -	1 drachm.
Camphor - - - -	,,
Extract of belladonna - -	,,

twice a day. Steam the nostrils, and if the cough be hard, blister the throat with tincture of cantharides, or with the ordinary fly ointment. If the throat be sore, no ball should be given, nor should the carbonate of ammonia in any form, as its effects on the throat are most irritating. In this case, a drachm each of belladonna and camphor mixed with treacle may be placed between the horse's teeth twice a day, so that it may gradually pass down the throat.

I must caution the inexperienced horse owner to carefully consider the symptoms; and, if he is not quite certain what is the right course to pursue with regard to the *internal* administration of medicine, I would strongly advise him to dispense with it, and to content himself with following the general directions I have laid down, as regards fresh air and water, fomentations, warm clothing, laxative food, and nitre.

If there be great difficulty in breathing, which will occur when laryngitis is present, tracheotomy may have to be performed. Although this is a most simple operation, still it is generally advisable to defer it as long as possible, from the danger of its causing the horse to subsequently "make a noise," if the edges of the divided cartilage happen to unite in an irregular manner. When the animal's breathing becomes laboured, he should be carefully watched, and the operation performed the moment he begins "to fight for breath."

If diarrhœa sets in, it is not advisable to check it, as it is almost always an effort of nature to expel waste and deleterious matter from the system.

In the second stage, when the fever has passed off,

corn should be gradually given, with, if much debility exists, a couple of quarts of beer a day, or skimmed milk with eggs beaten up in it. Discontinue the nitre, and give daily in a pint of ale—

Powdered gentian - - -	3 drachms.
,, ginger - - -	2 ,,
Sweet spirits of nitre - -	$1\frac{1}{2}$ oz.

If the cough continues, blister the throat.

Nurse the horse, and attend to his general health.

N.B.—Chest diseases are often far more serious than what they appear to be at the first glance. The amateur should, therefore, use, when possible, the clinical thermometer, for there is always, during the acute stage of these attacks, a marked rise in the temperature of the body, which rise indicates a proportionate degree of danger to the animal.

Congestion of the Lungs

Is usually caused by over-exertion, especially when the animal is out of condition; by defective ventilation in the stable; and by cold. The distress is caused by the lungs becoming gorged with more blood than they can purify and return back to the heart. Death, in this disease, occurs from suffocation.

Symptoms.—"Air is taken freely into the lungs, but the circulation almost ceases in them, and in spite of his hurried breathing, as shown by his panting sides, he is almost as completely suffocated as if a cord were

tied round his neck. On examining his eyes and nostrils they are seen to be turgid and *purple*, the vessels being filled with carbonized blood, while the heart beats rapidly but feebly, and the countenance is expressive of anxiety and distress." (*Stonehenge.*)

"Congestion of the lungs is indicated by very rapid breathing, amounting in some cases to fifty, sixty, or seventy in the minute. The nostrils are distended, and the air expired is cold. Very rarely is there a decided beat of the pulse to be felt under the jaw; but the artery is distended with blood, and the fluid seems to creep through it by separate impulses. The animal stands with his forelegs apart, and, notwithstanding the distressed state of his breathing, seems to object to fresh air, as he always selects a corner away from an opening. This habit of seeking remote corners is observed in most cases of sickness among animals." (*The Field.*)

Treatment.—Give a stimulant such as 1 wine glass full of tincture of arnica, or a quarter of a pint of whisky or brandy (if the arnica be not at hand) in water, or sweet spirits of nitre 3 oz., which should be mixed with cold water. These stimulants may be repeated after a quarter of an hour or twenty minutes. Allow the horse plenty of fresh air to breathe and water to drink. Use warm fomentations to the sides. Place the legs in warm water. Hand-rub the body, and clothe comfortably. If the symptoms be not relieved, bleed to the extent of about a gallon.

During convalescence give laxative food with ½ oz. of nitre mixed in it daily.

Diffusable stimulants, by quickening the general circulation, tend to relieve congestion. Alcohol in small and repeated doses is a stimulant and diaphoretic (a medicine which increases the action of the skin); in large doses it is a narcotic. Arnica seems to have a special action in stimulating the small vessels of the surface of the body, hence its probable value in cases of congestion of the lungs.

Sore Throat (*Inflammation of the Larynx*).

(See remarks on "The Anatomy of the Organs of Breathing," at the commencement of this chapter.)

Sore throat is inflammation of the mucous membrane which lines the larynx, and is caused by exposure to cold or wet.

Symptoms.—The discharge of mucus (phlegm) from the larynx more or less closes it up, and occasions distress in breathing, "the inspiration being particularly prolonged, and attended by a peculiar harsh sound, succeeded by a short expiratory movement." (*Williams.*) This sound can be heard on applying the ear to the part. There is swelling of the throat under the jaws, and tenderness on pressure at this point. There is a strong, hoarse cough, the strength of which indicates that the expulsion of air from the lungs is made with ease, while the fact of the horse shaking his head from pain after coughing shows that its performance hurts him by reason of the air passing over the inflamed membrane. Breathing hurried. Inside of the nostrils and

eyelids red and appear filled with blood. Nose poked out. Anxious and distressed expression of face. Eyes prominent. Considerable difficulty in swallowing, food and water being often returned through the nostrils. Discharge from the nose, and flow of tears from the eyes. In bad cases, cold sweats break out over the body; "the pulse, which may at first be hard and full, soon becomes rapid and indistinct, fulness generally remaining; the visible mucous membranes now assume a livid appearance from non-oxidation of blood; prostration of strength becomes extreme; the animal staggers, finally falls, and dies after a few struggles." (*Williams.*)

Principles of Treatment.—In this disease the vessels that lie underneath the mucous membrane become distended with blood, which pours out a portion of its watery constituents into the substance of the mucous membrane, causing it to become soft and enlarged, and to discharge from its surface quantities of phlegm (mucus). These three conditions—congestion of the underlying blood-vessels, distension of the mucous membrane, and the presence of phlegm—cause distress in breathing, and more or less danger of suffocation by reason of the blocking up of the windpipe at this part. Hence the rational treatment is, (1) to relieve the congestion of the blood-vessels; and (2) to facilitate the expulsion of phlegm. With the latter object in view, we cause the animal to inhale steam, either plain, or from water in which oil of turpentine has been mixed; with the former, we stimulate the skin underneath the throat, hand-rub the legs,

and clothe warmly, so as to draw the blood away from the inflamed part. We give belladonna to relieve the congestion of the blood-vessels so as to check the escape, into the tissues, of the watery part of the blood. We prescribe nitre in order to diminish, by acting on the kidneys, the amount of blood there is in the system, and also to maintain its fluidity, which nitre and certain other salts seem to have the power of doing, so as to prevent the passage of the blood away from the seat of inflammation from becoming obstructed. And, acting according to similar principles, we supply the animal with green meat and laxative food, not forgetting to support his vital powers after the virulence of the attack has somewhat abated.

Subsequently blisters may be applied in order to draw an increased supply of blood to the part in order to cause the breaking up and absorption of any deposits left as a result of the inflammation.

Practical Treatment.—Allow the horse a plentiful supply of fresh air. Clothe warmly. Hand-rub the legs, rub into them the stimulating liniment—

Soap liniment - - - -	½ pint,
Strong liquor ammoniæ - -	1 drachm,

and apply straw or flannel bandages.

Make the horse inhale steam if it does not distress him.

Foment the throat, and after that is done apply the above liniment. If the case be at all serious, blister the throat with tincture of cantharides, or cantharides ointment. Give a drachm of the extract of belladonna

twice a day; place it between the horse's teeth, instead of giving it as a ball, which would irritate the throat; or give the electuary of belladonna and camphor as prescribed for cough. Give from a half to one ounce of nitre daily, dissolved in the water or food. Allow gruel, linseed tea, and linseed and bran mashes; substitute freshly-cut grass for hay. When the attack has subsided, the horse's strength should be kept up by gruel, and milk with eggs beaten up in it. Drenches and balls should not be used, as they would irritate the throat.

After an attack, it is perhaps the safest plan to blister the skin with biniodide of mercury, under the seat of the disease, three or four times in succession, and to put the horse on a course of iodide of potassium —1 drachm twice a day—for a fortnight or three weeks.

In severe cases, tracheotomy is often the only means for saving the patient's life.

Catarrh or Cold in the Head

Is inflammation of the mucous membrane which lines the nostrils and air passages of the head. It is generally caused by exposure to cold and wet, aided by change of temperature.

"*Symptoms.*—Catarrh is indicated by sneezing, running from the eyes, redness and dryness of the Schneiderian membrane [the mucous membrane which lines the nostrils], succeeded by a discharge, at first thin and colourless, which soon, however, becomes turbid,

yellowish white, and profuse. It is associated with a varying degree of fever, dulness, and debility." (*Williams.*) Cough is generally present.

Treatment.—Put the horse on bran and linseed mashes, and give some freshly-cut grass. Allow a constant supply of water to drink. Have the stable well ventilated, and keep the animal warmly clothed. Make him inhale steam from time to time in order to facilitate the discharge from the nostrils. If the cough be troublesome stimulate the throat with—

Soap liniment - - -	½ pint.
Strong liquor ammoniæ - -	1 drachm.

If a stronger effect be desired, add another drachm of ammonia to the liniment.

Give from a half to one ounce of nitre daily in the food, or as a drench.

Two drachms of camphor, with or without a drachm of belladonna, made up into a ball with a little linseed meal, may be given with advantage every night. If the bowels be constipated, administer an enema of warm water (100° F.) Do not use purgative medicine on any account. (See page 239.)

If subsequently there be great debility, the horse's strength may be kept up with a couple of quarts of beer a day, and an ounce of chirretta (in India), or a drachm of sulphate of iron in the corn.

Simple Cough.

Simple cough is frequently due to the irritation caused by teething, independently of chill. The four-year colt is often affected in this manner. A teething cough may be distinguished by the fact that it is more violent in the morning than during the other portions of the day, and also on account of its being continuous.

Cough is an unsoundness.

To cure simple cough, warm clothing, the avoidance of cold and wet, feeding on green meat, bran and linseed mashes, with half an ounce of nitre daily in the water for a few days, will frequently be sufficient.

In India, four or five pounds of young bamboo leaves daily are often given with advantage.

If these simple remedies be not effectual give morning and evening:—

Belladonna, Camphor	- - of each 1 drachm,

made up into a soft mass (an electuary) of 3 or 4 oz. in weight, with linseed meal and treacle or honey. If placed between the horse's back teeth or on his tongue he will readily swallow it. If belladonna be not procurable, assafœtida may be substituted for it.

Balls are apt to irritate the throat and bring on a fit of coughing.

The throat may be stimulated with—

Soap liniment - - -	½ pint.
Strong liquor ammoniæ - -	1 drachm.

The clothing should be warm, the diet laxative, and no corn should be given. Horses doing fast work are liable to get coughs, if after exercise the hollow space between the branches of the lower jaw be not promptly and carefully dried. The practice of making horses wear " night-caps " (short hoods) tends, I think, to induce coughs.

Chronic Cough

Is often one of the after consequences of catarrh and bronchitis. It may accompany broken wind, roaring, indigestion, worms, &c.

Treatment.—Give green food, and bran and linseed mashes. Carrots " are beneficial in all chronic diseases of the organs connected with breathing, and have a marked influence upon chronic cough and broken wind." (*Stewart's " Stable Economy."*) Blister the throat with cantharides ointment, and give the ball recommeded for simple cough. If worms be present, treat for them. If the cough has been caused by a previous attack of bronchitis, try a course of iodide of potassium as recommended for sore throat.

Referring to arsenic, Mr. Finlay Dun remarks, " I find it useful amongst horses in relieving chronic irritable cough, especially when remaining after attacks of influenza and sore throat. In such cases, with an ounce of Fowler's solution [liquor arsenicalis] is advantageously united an ounce of potassium chlorate, and a drachm of belladonna extract, made into a draught with water or gruel." (" *Veterinary Medicines.*")

Asthma or Broken Wind

Is a rare disease, and only to be found among ill-kept horses. It is probably brought on by irritation of the nerves of the stomach caused by the eating of straw, and dry and innutritious hay, which irritation may be aggravated by working the horse soon after he is fed. In the process of breathing, air is taken into the lungs in a natural manner, but is expelled from them by two distinct efforts, the muscles of the abdomen aiding in a marked manner the final act of expiration; this is apparent by the heaving of the flanks. There is a peculiar cough. The difficulty of breathing is constant, but varies in intensity, being greatest after the horse is fed. The digestion and general health of an animal suffering from this disease are usually much out of order.

This affection is usually ascribed to the presence of air in the cellular tissue surrounding the lobules of the lungs, after rupture of some of the air-cells; hence the difficulty experienced by the animal in expelling the air taken into the lungs at each inspiration.

Treatment.—The treatment can only be palliative. Feed and water by small quantities at a time. Give carrots. Limit the amount of dry hay; substitute for it fresh-cut grass. A pint of linseed oil may be given now and then to keep the bowels in order, and to allay irritation of the mucous membrane.

The general health of the horse, and the proper ventilation of the stable should be attended to. He should

be kept short of food and water before being worked. An ounce of liquor arsenicalis, increased up to two ounces a day, given in his food for a fortnight, might be tried.

When doing continuous work for some hours, small quantities of gruel or water, given occasionally, are of benefit; while total deprivation of water is almost as bad as giving it in excess.

A pound of lard or butter, which may be given in balls, acts in abating the distress for a few hours.

Damp forage is recommended in this complaint. Professor Trasbot, of Alfort, referring to palliative measures, remarks: "We will only cite damped hay, green food, and above all, forage wet with molasses and water. This last regimen, employed often in the north of France, has given most satisfactory results."

Roaring and Whistling.

There is some diversity of opinion regarding the nature and causes of roaring and whistling, but for all practical purposes they may be considered to be varieties of the same affection.

Whistling is a sound, resembling in some degree the noise from which it takes its name, made by the horse, in a marked manner, during the act of inspiration, and also, though to a much lesser extent, as remarked by Professor Williams, during the act of expiration. It is generally due, as a result of disease, to diminution of the size of the larynx, owing to

thickening of the mucous membrane which lines that tube. As the vocal sounds of the horse are produced by the passage of air through the larynx, the structural alteration just described, by diminishing the calibre of the tube, naturally renders their tone higher, hence the objectionable noise. It may be due to hereditary predisposition.

This disease is an unsoundness which unfits the horse for fast work.

Roaring also takes place during inspiration, but in tone it is much louder, and not shrill like whistling. It is generally owing to an imperfect action of the muscles that open and close the larynx, caused by their becoming affected by a form of wasting palsy, a nervous diease which usually attacks the muscles on the left or near side of the throat.

On account of this wasting of the muscles, the walls of the larynx tend to fall in, so that this tube, through which air passes to and from the lungs, becomes diminished in size.

When roaring is due to partial paralysis of the muscles of the larynx, derangement of the stomach, from dry stimulating food, or from an excess of chopped straw — whose sharp ends, very probably, have an irritating effect on the throat, and possibly on the stomach if they be not perfectly masticated— is generally regarded as the original cause of the affection; for the branch of the nerve (the pneumogastric) which supplies the muscles of the larynx with nerve filaments, proceeds also to the stomach, and may become affected by irritation occurring in that organ. The results of experience lend weight

to this view. We can easily understand that irritation of the stomach would cause congestion of certain blood-vessels, which are close to portions of the nerve in question, so that pressure on it, and partial paralysis of the muscles it supplies, would be the result. Whether the theory be correct or not, the fact remains that roaring is often due to errors in feeding. The affection, in the form under notice, once acquired by sire or dam, is generally transmitted to their offspring. It is probably the cause of three-fourths of the cases of roaring met with.

The continued use of a tight bearing-rein or standing martingale may bring on these diseases, by causing the larynx to assume a permanently bent or distorted form. They may also be due to diseases and injuries of the nasal cavities, imperfect union of the edges of the wound made into the wind-pipe for the operation of tracheotomy, &c. Mr. Armitage states that the stabling of horses in ill-ventilated stabling is a prolific source of roaring.

"Mares, except when hereditary taint is peculiarly strong, rarely are affected, and small ponies, although liable to sore throat, strangles, etc., as well as the larger breeds, enjoy a strange immunity." (*Armitage.*)

In mild cases, the disease is usually not apparent unless the animal is put to a fast pace. At the commencement of the affection, the noise is often heard only when the horse begins exercise, and wears off as the work is continued. If the noise is worse at the end of a gallop than at starting, he may be regarded as a confirmed roarer.

"In addition to the sound emitted during inspir-

ation, the roarer generally has a cough which is diagnostic, being a loud, harsh, dry sound, half roar, half cough; and the generality of roarers are also grunters. It will also be found that the sensibility of the larynx is diminished in confirmed roarers, and that consequently it is difficult to make them cough in the ordinary way by pressing the larynx. In testing a horse for his wind, it is usually the practice with some to place him against a wall, and threaten him with the whip; if he grunts, he is further tested; if not, he is merely made to cough by pressing the larynx, and if the cough has a healthy sound the animal is generally passed.

"This plan is not always satisfactory, and the better way is to have the animal galloped, or if a cart-horse, to move a heavy load some little distance, when, if he be a roarer, he is sure to make a noise." (*Williams.*) A soft piece of ground should be chosen for the gallop, so that the clatter of the horse's feet may not interfere with the detection of the objectionable sound.

If a heavy load be not available, with which to test the cart-horse, we may improvise a drag by locking the hind wheels of the cart by means of a stout pole passed between their felloes.

In India, roaring is almost unknown among horses bred there, although many of their imported sires have been confirmed roarers; I have known instances of imported horses—and one case of a colt bred in India, whose dam, an Australian mare, was a roarer—which appeared to be confirmed roarers, became, after a time perfectly sound in their wind. The disease seems to be nearly as rare among Arabs as it is among the Indian

stock. The horses at the Cape of Good Hope too, I believe, enjoy a considerable immunity from this complaint. This points to the fact that it is a disease almost peculiar to certain climates—damp cold ones, I venture to suggest. We may accept the fact that feeding cart-horses on chopped straw is a frequent cause of roaring among them. In Syria, Egypt, and other parts of the East, horses are fed for about ten months of the year on barley or wheaten straw, with a little barley. The straw, however, during the process of thrashing is bruised and broken into short pieces, which renders it quite soft. These horses, I may say, never turn roarers.

Roaring may usually be traced to hereditary predisposition, in England, where the stock got by a roarer very generally develop "musical tendencies." Heavy cart-horses in England and Scotland are almost as subject to this complaint as are thorough-breds, while roadsters and hackneys seem to suffer least. Feeding cart-horses on large quantities of dry, hard straw, probably, sets up irritation in the nerves which become affected, just as readily as feeding on too much oats does. I have met with several instances of roaring among Australian horses, in India, caused by the practice adopted in many livery stables, there, of feeding animals on a large proportion of dry chopped straw and husks of various grains.

I believe that this affection is not at all as common among thorough-bred Australian horses, as it is among English racing stock.

Treatment.—In confirmed cases no active treatment

is of use, but in the early stages we may put the horse on linseed mashes and cooling food, and blister repeatedly under the jaw with biniodide of mercury (1 to 8 parts of lard).

Sprinkle the corn with water before feeding. Give carrots. Mix a couple of ounces of linseed oil in one of the horse's feeds daily, or give a bran and linseed mash every night. Avoid an excess of dry hay. Allow a longer time than usual to elapse between feeding and work. About a third of a pint of olive oil, or melted butter, will act well as a sedative. It may be given to the roarer—if a race-horse—half an hour before running. "I have no doubt that roarers might be improved a stone if they were trained from an open shed, sheltered from wet and rain, keeping them warmly clothed, and always in the open air." (*Admiral Rous.*) To modify the admission of air into the lungs, Mr. Reeve (*Veterinarian* for 1858, p. 486) suggested the use of a strap to pass over the false nostrils of the horse. This strap is to be fixed to each side of the bit, and kept in position by a strap at each side attached to the head-stall of the bridle. "To the inner surface of this strap, immediately over the false nostril at each side, was fixed a body resembling in shape the half of a hen's egg, cut longitudinally. When applied, these bodies pressed upon the triangular spaces formed by the apex of the nasal bones and upper jaw, thus closing the false nostrils, and partly diminishing the channel of the true ones." In cases of thickening of the mucous membrane of the larynx, Stonehenge recommends that "when the case is very intractable, the nitrate of silver (ten or fifteen grains in the ounce of

distilled or rain water) may be applied to the part itself by means of a sponge fastened to a piece of flexible cane or whalebone. The mouth should then be kept open with the ordinary balling iron, and the sponge rapidly passed to the situation of the top of the larynx, held there for a second, and then withdrawn."

Thick Wind.

This term signifies an impaired condition of the horse's powers of breathing, unaccompanied by noise, or by any peculiarity in respiration or expiration. When put to fast work, or to violent exertion, his breathing becomes more accelerated, and he himself more distressed than ought to be the case were his organs in a natural state, taking into consideration his working "condition;" while his flanks continue to heave for a long time after he has ceased labour. This state is usually the result of thickening of the bronchial tubes, owing to a previous attack of bronchitis, and is often accompanied by a chronic cough. Palliative treatment, similar to that recommended for broken wind and roaring, might be tried.

Highblowing.

Highblowing is not a disease, but is simply produced by the flapping of the horse's nostrils when he expels air quickly from his lungs. The larger, thinner, and more delicate the nostrils are, the easier will it be for

the horse to make this noise, which appears to be under his control. It is rarely heard except at the canter or gallop, and seldom when he is "doing all he knows." It is generally considered to be a sign of good wind. One can imitate the sound, near enough to understand how it is made, by bringing the lips of one's mouth lightly together, and then blowing moderately strong through them. If one blows very hard, the vibratory noise is not made.

Strangles.

Following the classification adopted by Professor Dick, we may define strangles to be a catarrhal affection accompanied by abscess under the jaw, with slight fever.

It is a disease which principally attacks horses between the ages of two and six years, and rarely affects the same animal twice. It occurs spontaneously, and is also contagious. A horse may get it from being stabled, though not brought into contact with one suffering from it; or even from being put into stables recently occupied by one or more affected animals. It may also be propagated by innoculation. The crowding of young stock favours its spread.

Well-bred horses, especially when stabled and fed under healthy conditions, are least liable to this disease. Young animals taken up from grass, and put on corn and housed in the ordinary manner, are most subject to it. Strangles is rare in India,

particularly among foals which are reared up singly or in small numbers.

Symptoms.—In ordinary mild cases, the horse is dull, feverish, and off his feed. There is usually cough and a discharge from the nostrils, which is watery at first, and thick later on. It differs from that of glanders by not being sticky. A tumour, which is at first hard, appears in the hollow between the branches of the lower jaw, and comes to a head in about ten days. In another form of the disease, for a month or more before the abscess forms, the animal loses condition, his coat stares, he becomes "hidebound," has a cough, and is out of sorts. This state has been sometimes mistaken for glanders. In strangles there is generally more or less difficulty of breathing.

Bastard strangles is the term applied to a low and very serious form of this disease; several indolent abscesses form in various tissues, and do not come to a head, after running a regular course, as they do in simple strangles. These abscesses generally form about the shoulders and chest. They may affect the internal organs, in which case recovery is all but hopeless.

Treatment.—If the colt or horse be at grass, he should be taken up and comfortably stabled. The stable should possess every condition necessary for health, as regards proper ventilation, good situation, freedom from crowding, &c. In mild cases, give a laxative but fairly generous diet, which may consist of bran and linseed mashes, gruel, boiled barley, carrots,

and freshly cut grass. Half an ounce of nitre may be daily mixed in the food or water. The swelling under the jaw should be frequently fomented with warm water; while at other times the part should be kept warm by means of flannel, wool, &c. When the abscess "points," and becomes soft, it should be opened with the knife or lancet. The part should be well fomented and a small plug of lint placed in the opening, in order to facilitate the discharge of the matter. If the tumour delays in coming to a head, Professor Williams recommends a fly blister to be applied, and twenty-four hours afterwards a warm poultice. The part should be shaved before being blistered. Some nicety of arrangement is requisite here to adjust a poultice properly. Premature lancing of the tumour should be carefully avoided. During the after treatment the horse should be liberally fed, and may have a couple of quarts of beer a day, with half a drachm of sulphate of iron in his food twice a day for ten days or so. As there is danger and difficulty in drenching, that operation should be dispensed with as much as possible.

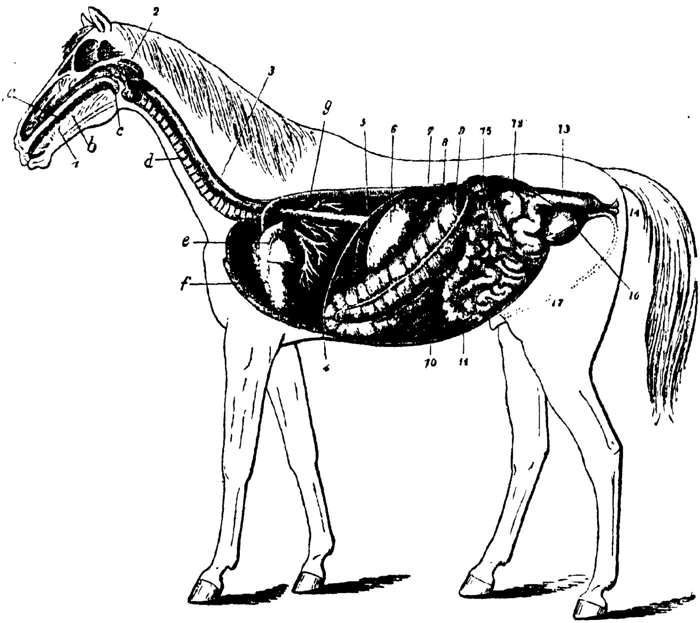
When the breathing is painful, the horse may be made to inhale steam, from boiling water mixed, as recommended by Mr. George Fleming, with oil of turpentine. The turpentine accelerates the discharge from the nostrils. If the breathing becomes very difficult—the animal fighting for breath—tracheotomy must be performed.

In all cases, the horse should be most carefully nursed and the sanitary conditions of the stable should be attended to. Both in bastard strangles, and in the form in which there is a long premonitory period of

ill-health before an abscess appears, the animal should be liberally fed, and if his appetite fails he may get milk and eggs. A quart of ale twice a day will be a most useful tonic. In India an ounce of powdered chirretta may be given twice a day in the food. If a horse will not eat it, make it into a decoction and give it in the ale. In cases of great debility, give an ounce of liquor arsenicalis, or five grains of arsenic daily in the food for about ten days, and repeat after an interval of a week.

Roaring and glanders are the chief after effects to be feared from an attack of strangles. The fact of a horse having passed safely through an attack of this disease certainly tends to increase his value.

Fig. 14.



DIGESTIVE AND MALE URINARY APPARATUS OF A HORSE *(after Megnin).*

1. Mouth.
2. Pharynx.
3. Gullet.
4. Diaphragm.
5. Spleen.
6. Stomach.
7. Duodenum.
8. Liver (upper extremity).
9. Great colon.
10. Cæcum.
11. Small intestine.
12. Floating colon.
13. Rectum.
14. Anus.
15. Left kidney and ureter.
16. Bladder.
17. Urethra.

a. Hard palate.
b. Tongue.
c. Soft palate.
d. Trachea.
e. Pulmonary artery (divided).
f. Heart.
g. Posterior aorta.

CHAPTER XII.

Theory and Practice of Feeding Horses.

ANATOMY OF THE DIGESTIVE CANAL—COMPOSITION OF FOOD—SKETCH OF THE PROCESS OF DIGESTION—ON WATERING HORSES—PRACTICAL RULES FOR FEEDING AND WATERING HORSES.

As most of the diseases described in the next chapter are due to errors of diet, I have thought it advisable to insert here the following sketch of the theory of digestion, and a few remarks on its practical application.

Anatomy of the Digestive Canal.

The *mucous membrane*, which we may regard as the internal skin, lines the entire length of the digestive canal from the lips to the anus, and also lines the air and urinary passages, the interior of the ears, and the eyelids. It is continuous with the skin, while the skin is continuous with the *sensitive laminæ* or membranous folds which cover the pedal bone and secrete the inner layer of the horn of the hoof (see Fig. 5). These three surfaces are not alone continuous one with another, but are very similar in structure, and possess strong mutual sympathy. Thus in catarrh, for example, the skin loses its polish and the intestines become irritable. We have the condition of "hidebound" during an attack of indigestion, and inflammation of the feet from superpurgation.

The horse has forty *teeth*—the mare thirty-six;—

twelve *nippers* in front, four eye or *canine teeth* (*tushes*), which are absent, or only in a rudimentary state, in the mare, and twenty-four back or *molar teeth*, which by the side play of the jaws form a powerful mill for the reduction of the forage. The grinding surface of the lower molars slopes upwards and inwards at an angle of about 25°, while the upper ones slope downwards and outwards at about the same angle.

The horse is provided with large *salivary* glands, which secrete saliva into the mouth.

The mouth communicates with the *gullet*, which is a narrow, dilatable, membranous tube. It is placed above the windpipe, whose entrance is guarded by a cartilaginous valve (the *epiglottis*). As the gullet enters the stomach it is thrown into folds which act as a valve in preventing the contents of that organ from being vomited up. The gullet is composed of the mucous membrane which lines it, and of a muscular coat.

The *stomach* is supplied with a large number of glands which secrete gastric juice into it for the digestion of the food. This organ has three coats—the mucous membrane, a muscular coat, and a serous covering (the *peritoneum*), which is a smooth, slippery membrane, whose office is to prevent friction between the internal organs. The capacity of the stomach is about three gallons.

The *small intestine* commences at the lower end of the stomach. It is about 72 feet long and about 1½ inches in diameter. Like the stomach it has a mucous, muscular, and serous coat. The *bile* (from the liver) and *pancreatic juice* (from the pancreas) are carried by

a common duct into the intestine close to the stomach. The small intestine terminates at the *cæcum*, which is the commencement of the *large intestine*, and forms a *cul-de-sac* of more than three feet in length, and of a capacity of about seven gallons. The large intestine is about twenty feet long. It is straight, for some distance, at its termination—the rectum, in which the dung becomes collected before being expelled.

Composition of Food.

The food is composed of—

Albuminous matters.
Starch.
Sugar.
Fat.
Mineral matters.
Woody fibre.

Before these constituents can be absorbed into the blood for the building up of the various parts of the system, they have to become dissolved, for if they remained solid they would be unable to gain entrance into the blood vessels, blood being the vehicle for conveying the elements of repair to the various tissues as well as for removing broken-up and waste matters. Digestion, then, is the process by which the food becomes dissolved. Sugar and mineral salts do not require any preparation to convert them from a solid to a fluid form; woody fibre may be regarded as useful simply to supply bulk to the food, so that the stomach . intestines may be enabled to move it about, and to

act as a mechanical irritant for preventing constipation. The albuminous or so-called muscle formers, of which the white of egg is an example, is dissolved by the gastric juice, the starch by the saliva and pancreatic juice, while the fat is made into a soapy solution by means of the pancreatic juice and bile.

Sketch of the Process of Digestion.

When food is taken into the mouth it becomes mixed with saliva which is poured out from the salivary glands. The chief offices of the *saliva* are—(1) to moisten the food and render it easy to be swallowed. (2) To convert a portion of the starch of the food into a soluble compound, so that it can be readily absorbed into the blood. (3) To correct, by virtue of its alkaline nature, any undue acidity of the stomach; and (4) to supply, by means of the bubbles it contains, a certain amount of air to the stomach, which appears to need it when performing the function of digestion. The salivary glands of the horse are larger than those of all other animals except ruminants (cattle, sheep, &c). It has been proved by experiment that food is much more readily digested in the stomach when it has been previously mixed with saliva, than when moistened with water alone. It has also been proved that the drier the food, the more saliva is poured out into the mouth when it is being chewed; while we all know that the drier the food, the more thoroughly must it be masticated before it can be swallowed. Experience,

as well as the foregoing facts, proves that the food of the horse should be given to him dry.

The principal object of chewing is to allow the digestive fluids to get free access to the various particles of the food.

Owing to the smooth surface of most grains, they can be much more readily swallowed when given whole than when bruised or broken, hence the advisability of these processes.

We may also conclude that a horse ought to be encouraged to eat his food slowly.

As long as the stomach is empty, gastric juice is not secreted; but when food is swallowed, its presence sets up in the stomach a certain amount of irritation, which causes blood to be drawn to the part. The gastric glands thus receiving a large supply of material from which to manufacture gastric juice, pour it freely into the stomach. The office of the gastric juice is to change the albuminous matter of the food into a soluble form; by its antiseptic properties to prevent the food from becoming decomposed as long as it remains in the stomach; and, by dissolving the envelopes which enclose the globules of fat, to split it up into a fine state of division, so that it may be easily absorbed.

If the horse be worked soon after being fed, the exercise will cause the blood to be drawn away from the stomach to the muscles of the limbs and to the organs of breathing; hence the secretion of the gastric juice will be more or less checked, and the food will be liable to become decomposed; the result of which would be that the stomach and intestines will become distended with

gas, and the animal will suffer from colic. We may therefore lay down the rule that a horse should not be worked for at least two hours after he is fed, assuming that in that time his stomach will have nearly completed its task.

If a horse, soon (say within an hour) after being fed, drinks a large quantity of water, or what would be but a fairly moderate quantity at other times, the fluid thus taken is apt to dilute the gastric juice to such an extent that this secretion will be unable to prevent the food from decomposing and giving off the gas which causes flatulent colic; it will also be unable to perform its office of dissolving the albuminous matters. Hence we may take for granted that a horse should not be watered soon after he is fed.

If the food of the horse contains a large amount of moisture, as is the case when he is fed on quantities of boiled grain, rank grass, or turnips, such food may be the cause of derangement of his digestive organs, from the saliva being secreted in too small a quantity, and from the gastric juice being inordinately diluted by the water contained in such fodder.

The albumen and some of the starch of the food having become dissolved, and the fat split up into fine particles, the resulting fluid (*chyme*), as it is prepared, leaves the stomach and enters into the small intestine, where it becomes mixed with the pancreatic juice and bile. The former dissolves the remainder of the starch, and, by reason of its alkaline nature, converts, with the aid of the bile, the fat into an emulsion or soap. The bile acts as a natural purge, and prevents, by its antiseptic properties, the residue of the food from decomposing

as long as it remains in the intestines. Deficiency in the supply of bile is followed by constipation, with derangement of the health, by reason of the absorption of deleterious gases from the decomposing food before it is expelled from the bowels.

After the chyme becomes mixed with pancreatic juice and bile it is termed *chyle.*

The liver of all the higher animals secretes a constant supply of bile, which is greater while digestion is going on than at other times. In the case of the horse the bile flows directly into the small intestine. In man, cattle, sheep, dogs, &c., the bile flows into a reservoir, the *gall-bladder*, where it is stored up, to be discharged, however, when chyme enters the intestine. Hence it would appear that animals provided with a gall-bladder should be fed at fixed intervals, while the horse should have a more constant supply of food.

In the stomach, the food is subjected to a churning process, which brings all its particles under the action of the gastric juice ; while the intestines have a worm-like motion which expels the food onwards. If the food enters the small intestine in an unprepared state, as a result of work soon after feeding, indigestion, &c., it will irritate the bowel, and will cause it to contract in a spasmodic manner, the result being that the nerve fibres of that part of the intestine become unduly pressed upon, and colic ensues.

When there is an excess of albuminous matter in the food the gastric juice is unable to convert the whole of it into a soluble form. The food then quits the stomach and enters the small intestine in an unprepared state, the result being that derangement of the

intestines takes place, for the functions of the various portions of the digestive canal are thrown out of working order when unsuitable food is brought into contact with them. Thus large quantities of beans produce constipation, and gram (in India), diarrhœa, both these foods being rich in albuminous matter.

The stomach of an animal is complex in proportion to the amount of preparation its natural food requires in it. Thus we find that the stomach of weasels and ferrets, whose natural food is blood, which requires but slight modification, is little more than a mere enlargement of the gullet. The stomach of cattle is, on the contrary, extremely complex, consisting of one true and three preparatory stomachs. The stomach of the horse is small, while but half the surface of its interior is capable of performing the operations (excepting that of movement) which are necessary to digestion, the other half being merely a continuation of the gullet. Hence we may reasonably conclude that straw, husks, over-matured grass, &c., are totally unsuitable to the horse, though well adapted to the feeding of cattle.

The large size of the horse's intestines shows that his food should be of a bulky nature to admit of the intestines contracting on it in a natural manner, and getting rid of it by their peculiar worm-like motion.

If the food be given in too concentrated a form the intestines will get too much work to do, and diarrhœa or other derangements will ensue. Hence the advisability of allowing the animal hay at the same time as he gets his corn, or of giving him chopped hay through it.

The small size of the horse's stomach, compared to

the large capacity of his intestines, points to the fact that he should be allowed to eat very frequently.

The chyle becomes mixed in the small intestine with fluid secreted by certain small glands. This intestinal juice completes the solution of the undissolved nutritive matter of the food. Absorption commences in the small intestine, and is completed in the large one, while the unappropriated matters are expelled as dung.

On Watering Horses.

If a horse drinks water when digestion is not going on, the amount needed for the requirements of his system is absorbed with extreme facility, while the surplus remains in his intestines to be taken up by the blood-vessels as the blood demands dilution. Food requires for its digestion a large quantity of various fluids, such as saliva, gastric juice, &c., which are derived from the blood, and contain at least 99 per cent. of water; hence we may assume the propriety of watering horses before they are fed.

Experience proves that it is perfectly safe to water horses immediately after work, no matter how hot they may be, provided always that the water is not too cold; but that they are apt to get colic, or be otherwise injuriously affected, if they are allowed to drink largely after they have cooled down. It is important to recollect that the only harm cold water of itself can do the horse, when digestion is not going on, is the shock which its low temperature causes to the nervous system of the animal. A moderate degree of cold acts no

doubt as a healthy stimulus, though its excess may kill by nervous shock. A quantity of cold water remaining unabsorbed in the intestines will cause contraction of the muscular coat of the bowels, and consequent colic or diarrhœa. The very time above all others that a horse requires a liberal drink of water is when he is heated and exhausted from fast work, for his blood will then be in an unnaturally thick state on account of the large amount of water, in the form of perspiration, &c., it has lost, and will consequently be unable to circulate with due facility. When a horse is heated, the small blood-vessels which are situated on the surface of the interior of the stomach and intestines, and whose office is to absorb fluid, will, owing to the rapid state of the circulation, take up the water drunk with extreme rapidity. But if the horse be allowed to cool down without getting water, his blood will gradually recover its fluidity at the expense of the tissues. It is reasonable, then, to suppose that useless waste of tissue—of which water forms a component part—and consequent exhaustion is entailed by stinting the horse of water when he is heated from exercise. Experience proves, both in our own persons and in that of our horses, that drinking a moderate amount of water when the man or animal is hot and tired from hard work, diminishes to a very great extent or altogether obviates any subsequent exhaustion and depression. An owner should exercise his judgment in guarding against the possibility of his horse getting water which is too cold.

I may state generally that the only office water performs in the internal economy of horses is to keep the blood in a properly fluid state; hence the advisability

of having a constant supply of it in their stalls, and of their being frequently watered within proper limits when performing continued hard work.

Practical Rules for Feeding and Watering Horses.

1. Certain precautions have to be observed when using the following foods :—

Wheat is apt to prove very indigestible on account of its glutinous nature, which prevents the digestive fluids from passing easily through its substance. If used raw it should be bruised, and should then be mixed with bran or chopped hay. A couple of pounds of boiled wheat may be given once or twice a day if the horse requires soft food.

Beans, *peas*, and *gram* (in India) should not be given, if other suitable grain be obtainable, in larger quantities than five or six pounds daily. These foods should be crushed and mixed with oats, bran, chopped hay, barley, or with Indian corn, which forms with them a capital mixture, as they have an excess of muscle-forming material (albumen), while maize is comparatively poor in it. Beans have a constipating effect.

Barley, if given, should be employed at first in small quantities, for, until the horse gets gradually accustomed to it, a full supply is apt to scour him. As the husk is hard and liable to make his mouth sore, barley should be bruised and mixed with chopped hay. It is the only grain which is generally used for horses in Syria, other Eastern countries. It is there mixed

with wheaten or barley straw which has been broken into small pieces and thoroughly bruised by the native thrashing machine (Arabic, *noraj*). The chaff, thus treated, is called *tibben* in Arabic. A mixture of barley and *tibben* keeps horses in excellent condition without any other kind of forage. If, instead of *tibben*, chopped straw be used, the sharp ends of the latter will cause the horse's mouth to become sore. The same result is brought on by using raw barley by itself.

Boiled barley is excellent for delicate horses, even when they are put to hard work.

Straw, except when it is cut and given green before the corn has matured, proves indigestible to the horse when it is given in the ordinary way. It often produces obstinate constipation, and is a frequent cause of roaring. Over-matured and badly-saved *hay* is open to the same objection.

When saving hay, the object should be to deprive the grass of its excess of water, so that it may keep without suffering any change in its nutritive properties. The greener in colour hay is, the better, so long as it is dry and sweet.

The only *roots* which seem to agree with the horse are carrots, parsnips, and perhaps Swedes in small quantities. Unripe roots of all kinds and the leaves of roots should not be given, as theyare very apt to cause diarrhœa and other derangements on account of the oxalic acid they contain.

2. As a general rule, grain, before being used for feeding horses, should be a year old. This fact is probably due to the necessity of the grain losing a portion of

its moisture so as to allow the digestive juices (saliva, gastric juice, &c.) to soak through its substance. Some of the starch of the grain probably becomes converted into a substance (dextrine) which is more easy of digestion than the starch itself.

3. The horse's corn, as a rule, should be given to him dry and in a bruised condition. When the animal, from imperfect teeth or accident, has difficulty in chewing his food, his corn may be boiled. Certain grains, such as linseed, from the hard nature of their husk, require to be boiled or soaked in water.

4. The horse's daily allowance of corn should be divided into several (four, five, or six) feeds, which should be given at fixed hours. The larger the amount of corn, the oftener should the animal be fed.

5. The horse should be allowed hay at his feeding hours, so that he may give bulk to the corn by mixing hay through it, in the same manner as we eat vegetables and bread with our meat; or a pound of chopped hay may be mixed through each feed.

6. A horse in full work should not be stinted in the amount of hay he gets, provided it be fresh and sweet.

7. A horse should not be put to work, if possible, for at least two hours after getting a full feed.

8. On a journey a horse should be baited every hour, or every hour and a half, with some water—say three or four quarts—and a couple of pounds of corn.

9. Boiled food should always have salt mixed through it.

10. Greedy feeders may have chopped hay mixed through their corn in order to make them chew it properly.

11. Horses which are inclined to scour may have from two to four pounds of dry bran added to their daily allowance of corn, or a pound of chopped hay may be mixed with each feed, or some hay may be given before feeding. The object here of giving bran or hay is to increase the bulk of the food, so that the intestines may easily contract on it. Such horses should have a constant supply of water, or should be watered at frequent intervals, getting, in that case, only a little at a time.

12. The best rule for watering horses is to give them a constant supply of water in their stalls. If this cannot be conveniently done, they should be watered *before* each feed, or at least two or three times a day, according to the heat of the weather, before feeding.

13. After violent exertion, however hot a horse may be, he should get a moderate allowance of water to drink, say about a gallon, care being taken that the water is not too cold. As pointed out by Sir Frederick Fitzwygram, there is far less risk of danger in watering a horse at that time than there would be when he had cooled down.

14. On a long journey a horse should be frequently watered.

15. A full amount of very cold water may prove injurious to a horse, but a moderate amount, given under proper conditions, will never hurt him.

16. If it be not convenient to have very cold water chilled before giving it to a horse to drink, he may be allowed ten or fifteen "go-downs" at a time, at short intervals, till he has assuaged his thirst.

17. Soft water should be used in preference to hard, which often contains an amount of mineral matter that may have an injurious effect on the stomach and intestines, and may consequently give rise to colic and other derangements.

CHAPTER XIII.

DISEASES OF THE STOMACH AND ALIMENTARY CANAL.

SPASMODIC COLIC—FLATULENT COLIC—INFLAMMATION OF THE INTESTINES, OR ENTERITIS—INFLAMMATION CAUSED BY THE EATING OF SAND—SUPERPURGATION—DIARRHŒA—INDIGESTION—CONSTIPATION—INTESTINAL WORMS—BOTS—CRIB BITING AND WIND-SUCKING—LAMPAS—APHTHÆ.

Spasmodic Colic

Is spasm of the muscular coat of the intestines, caused by irritation due to the presence of undigested matter. It is generally induced by injudicious watering and feeding, especially when the horse is exhausted from hard work and long fasting, for then the digestive apparatus is in a weakened state. Some animals, from natural or induced weakness of these organs, are prone to colic at all times.

There is little difference between the two forms of this complaint, except that flatulent colic is accompanied by the evolution of gas.

Horses that are subject to colic without ostensible cause, should be regarded with extreme suspicion, for such attacks are often indicative of the presence of calculi (balls of indigestible matter) in the bowels, or of other grave affections.

Symptoms.—"The symptoms are—sudden pain, pawing, kicking at the belly, looking round at the flanks, lying down, rolling, struggling in a variety of ways, or lying outstretched; then suddenly rising, shaking the body, and remaining for a short period free from pain. After a short interval, however, the symptoms return sometimes in an aggravated, occasionally in a modified form, and this occurs again and again, until the animal is either relieved or dies from pain and exhaustion." (*Williams.*) During the intervals of rest the breathing, pulse and skin are natural. The skin over the abdomen is not sensitive as it is in inflammation of the bowels; while pressing and rubbing it seems to soothe the animal. During the periods of pain the pulse is quick and *full.* The most distinguishing symptom is that the pain is intermittent. If the body continues wet with sweat the case may be deemed a very serious one.

As mistakes are liable to be made in deciding whether the attack is one of colic or inflammation of the intestines (enteritis), I would most strongly advise the amateur to carefully study the symptoms of both diseases before deciding on a doubtful case.

Entire horses, when suffering from colic, especially when they show a tendency to lie on their backs, should be examined for hernia.

Treatment.—Mr. Gamgee taught that colic being due to the presence of some undigested irritating substance in the bowels, its rational treatment is removal of the offending matter by purgatives and enemas. The usually accepted method of treatment for colic is to give a full dose of aloes, either in a ball or as a drench,

and, if the pain continues very great, 2 drachms of opium in a ball, or 2 oz. of its tincture in a pint of water some time after. As aloes is not always a safe agent in the hands of an amateur, and as its administration will throw the horse for a few days out of work, I would advise the non-professional owner to content himself, in ordinary cases, with giving the following very excellent drench :—

Tincture of opium	- - - -	1 oz.
Turpentine	- - - - -	2 ,,
Linseed oil	- - - - -	$1\frac{1}{2}$ pints.

If the attack be very slight the animal may get the following ball :—

Opium	- - - - -	1 drachm.
Assafœtida	- - - - -	1 ,,
Camphor	- - - - -	2 ,,

Or, if nothing else be at hand, give a quart of warm ale, fortified by a couple of glasses of spirit, and a tablespoonful of powdered ginger.

If the antispasmodic be not successful, do not repeat it, but give the horse, without loss of time, a physic ball, or $1\frac{1}{2}$ pints of linseed oil. Keep him quiet in his stall with plenty of bedding under him, and do not distress him by exercise. Administer one or two enemas of warm water (100° F.) ; foment and hand-rub the abdomen ; keep the horse warmly clothed. If the bladder be full, pass a catheter.

If the pain continues to be very great, give 2 oz. of tincture of opium in a pint of water. If neither opium nor its tincture be at hand, give

3 drachms of camphor made into a ball, or dissolved in a little spirit.

Above all things exercise patience, and do not continue giving opiates. After the physic, one sedative is quite enough, and even that should not be administered unless the symptoms of pain are great.

On no account delay giving a purgative if the case has been allowed to run on, or if the symptoms are at all urgent. The oil will hardly at all stop a horse in his work.

Flatulent Colic.

This dangerous form of colic is due to the distension of the bowels by gas, resulting from the decomposition of undigested food contained in them. It sometimes follows spasmodic colic; in this case, we have, in the first instance, spasm due to irritation set up by the presence of undigested matter; and, subsequently, distension, owing to its decomposition.

We may readily conclude that flatulent colic is caused by errors in feeding and watering the horse. Perhaps he has been fed on a quantity of rank grass, watery roots, or boiled grain, which, on account of its moist nature, is quickly swallowed without being properly masticated; the gastric juice, being too largely diluted by the fluid portion of the forage, performs its office imperfectly, decomposition takes place, and the bowels become filled with gas. Or, the thirsty horse after feeding may have had a draught of water, which may have diluted the gastric juice to an injurious

extent, or may have checked its secretion by chilling the stomach, and we may get a case similar to the one just described. Or, the horse may have been worked soon after being fed. Here the muscular labour may check the secretion of gastric juice, while distension and colic will probably follow.

In Northern India, horses are generally fed on a grain called *gram*, which is very similar to peas in its composition. As it is hard and dry, some persons ignorantly consider that it should be well soaked in water before being given to the horse; if this be done, the grain is imperfectly masticated, and the *bolus* of food, instead of being thoroughly mixed with saliva on entering the stomach, in which state it would have been ready for reception by that organ, is simply saturated with water. Sometimes the grain is steeped so long that fermentation actually commences in it before it is given to the horse. I need hardly say that this system of feeding is a fruitful source of indigestion and a not uncommon one of colic.

Watering after feeding was, some years ago, a not unfrequent practice in batteries of artillery and regiments of cavalry in India, and was of course attended by many cases of colic, with instances of rupture of the stomach now and then. I am glad to say that such barbarous methods are falling into disuse in that country. Watering after feeding is particularly dangerous when gram is used, as that grain readily ferments on being soaked in water.

Symptoms.—The symptoms resemble those of spasmodic colic, except that they are less violent, though

much more continuous, and there is considerable distension of the abdomen. The breathing is difficult, and there is more or less delirium in bad cases.

Great distension of the abdomen is often a sign of a fatal termination of different diseases, as in superpurgation for instance.

Laminitis sometimes ensues after an attack of this form of colic.

Treatment.—Give as a drench—

Tincture of opium	1	oz.
Turpentine	2	,,
Linseed oil	12	,,

The oil is a gentle laxative and vehicle for the turpentine; the opium allays pain; while the turpentine checks the formation of gas, and seems to aid in its expulsion by causing contraction of the muscular coat of the intestines. Medicines in a solid form, though appropriate in spasmodic colic, should not generally be given in flatulent colic.

We may repeat the tincture of opium in doses of 2 oz. in half a pint of linseed oil once or twice. Foment the belly and give an enema of warm water (100° F.). Instead of the foregoing drench, we may give (as first proposed by Mr. T. Hopkin, F.R.C.V.S.) 2 drachms of carbolic acid in a pint of water. Mr. A. Johnston, M.R.C.V.S., strongly recommends this practice in cases of flatulent colic. The action of the carbolic acid is to check decomposition of the food.

Hand-rubbing the abdomen will afford relief. I would advise that the horse should not be back-

raked, and that not more than two enemas should be given, lest the part be made so sensitive and irritable that the animal will be afraid to pass wind.

If medicines fail to overcome the violence of the attack, the intestine may be punctured in the manner described by Messrs. Peuch and Toussaint, from whose work on Veterinary Surgery the following has been abridged :—

Puncture of the Intestine for Flatulent Colic.

This operation is performed by means of a trocar and cannula. The latter is a metal tube which forms a sheath for the former, and is about 1-5th of an inch in diameter and 6 inches long. The trocar is a steel, triangular pointed rod, which fits into the cannula, and is provided with a handle to facilitate its insertion into and withdrawal from the bowel.

The operation is performed in order to give vent to gas which has accumulated in the intestine during an attack of flatulent colic. Very little risk attends it when done under favourable conditions. The veterinary surgeon may place his hand up the rectum to find out where the gas has chiefly accumulated, and where he ought consequently to drive the instrument.

The puncture should be made if the symptoms do not become relieved by the medicine given, while it should on no account be delayed until the horse becomes exhausted, lest fatal complications, such as choking, or rupture of the stomach or intestines, may ensue.

The best place to make the puncture is on the right flank, at a spot equidistant from the point of the hip (anterior iliac spine), the end of the last rib, and the side processes of the vertebræ of the loins. If the first puncture, owing to blocking up of the cannula, to its being too short, or to the intestine being filled with solid matter, does not succeed, we may repeat the operation a little above or below the first puncture, on the left side, or where we perceive the accumulation of gas to be greatest. Many authorities agree that the puncture may be made without danger on the left side.

In order to injure the intestine as little as possible, and to prevent the chance of particles of food getting into the abdominal cavity, and thus setting up peritonitis, we should use an instrument of small diameter; with such a one the operation is perfectly safe, on either side.

For securing the animal it is often enough to simply tie up one fore-leg, and to apply the twitch; in fact, these precautions are not always necessary. One ought to take the opportunity of making the puncture when the animal is lying down. One should carefully guard against the chance of his hurting himself while the puncture is being made, from throwing himself about when suddenly seized with colicky pains. In a few cases the horse may be kept lying down by means of hobbles.

The operation itself is a very simple affair. The operator, having placed himself on the right side of the horse, should make an incision through the skin with a bistoury, at the point chosen, of a little less

than half an inch in length, in order to allow the trocar to penetrate easily, and to prevent air getting into the loose tissue underneath the skin. Then, while holding the trocar with his left hand, he should place its point perpendicularly into the incision, and should strike the handle of the instrument a sharp blow with the palm of the right hand, so as to make it penetrate into the intestine. The gas escapes with violence on the trocar being withdrawn out of the cannula. In proportion as the gas escapes so does the inflation of the intestines diminish. One should take care to press the cannula as far as it will go, so that it may penetrate into the intestine, and may not remain between it and the flank. If the evolution of gas stops suddenly, on account of the cannula becoming obstructed, the instrument may be mopped out by means of a small metallic stem prepared for that purpose, but not with the trocar, which might wound the intestine. If these means do not succeed, a second puncture, some distance from the first one, may be made.

The cannula should be kept in until the gas ceases to escape and the inflation has nearly disappeared. It is always prudent not to leave the instrument longer in than a quarter of an hour, so as to avoid, in some measure at least, the chance of peritonitis. Some practitioners take it out after five or six minutes, if the evolution of gas has ceased by that time. Another objection against allowing the cannula to remain long in, is that it might wound the intestine during the struggles of the animal, or on the collapsing of the bowel.

To remove the cannula, one should seize it with the

right hand, and should raise it rapidly, but without roughness.

There is no need to do anything to the external wound, as the puncture becomes closed up by reason of the hole which was made through the skin shifting its position away from that made through the abdominal muscles, on the swelling going down.

The practice of injecting medicines through the cannula is very dangerous, as the fluid might go the wrong way, and escape into the abdominal cavity, with the very probable result of peritonitis and death. It is much better to give a drench in the ordinary manner.

Inflammation of the Intestines (*Enteritis*).

Professor Williams considers the mucous membrane which lines the bowels to be the chief seat of this disease.

I may here mention that the bowel is composed of three layers or coats, viz., the serous, muscular, and the mucous or inner layer.

This disorder generally proves fatal, and usually runs its course in a few hours.

The attack sometimes appears to come on without any assignable cause. It may be a termination of colic, as the presence of any irritating matter may bring it on. It may also be caused by over-fatigue and chill.

Laminitis sometimes follows an attack of enteritis.

Symptoms.—As all inflammations of the mucous

membranes are characterized by a tendency to spread over the entire mucous surface, we find that, in this disease, the membranes of the eyelids and nostrils have an unnaturally red appearance; the expression is very anxious; the temperature of the body is lower than usual; the pulse wiry (small and hard) and quick, often reaching to over 100 beats in the minute—natural pulse about 38. The pain is continuous, without the remissions so characteristic of colic. Pressure on the abdomen with the hand gives pain. In the first stages of the attack the horse shows that he is averse to pressure on the belly, by the careful manner in which he gets down on the ground to roll, and by the way he kicks at, or rather pretends to kick at, his abdomen. "The continuance of this torturing pain drives the animal to a state of extreme restlessness and distress; he is either pawing, or repeatedly lying down and rising again; or else he is walking round his box, breathing hard, sighing, and perhaps occasionally snorting. At length his respiration becomes hurried and oppressed; his nostrils widely dilated; his countenance painfully anxious and expressive of his sufferings; his body bathed in sweat at one time, but at another cold, and occasionally seized with tremor; and his tail erect and quivering.

"The next stage borders on delirium. The eye acquires a wild, haggard, unnatural stare; the pupil dilates; his heedless and dreadful throes render approach to him quite perilous; in short he has become an object not only of compassion but of apprehension, and seems fast hurrying to his end; when all at once, in the midst of agonizing torments he stands quiet, as

though every pain had left him, and he were going to recover. His breathing becomes tranquilized, his pulse sunk beyond all perception; his body bedewed with a cold, clammy sweat; he is in a tremor from head to foot, and about the legs and ears has even a death-like feel. The mouth also feels deadly chill; the lips drop pendulous; and the eye seems unconscious of objects. In fine, death, and not recovery, is at hand. Mortification has seized the inflamed bowel; pain can no longer be felt in that which but a few minutes ago was the seat of exquisite suffering." (*Percivall.*)

Distinguishing Signs between Enteritis and Colic.—As inflammation of the intestines may be mistaken for colic, I may state that the chief differences between the symptoms of the two is that in the latter the pain comes on in paroxysms, between which there are intervals of ease; the pulse and breathing, skin and mucous membrane, are almost, if not quite, in a natural condition during these periods; rubbing and pressing the belly with the hand seem to ease the pain; while the animal appears to obtain temporary relief from rolling on the ground. In enteritis the very reverse of all this is the case: the mucous membranes are unnaturally red, and the skin colder than usual. During the paroxysms of colic the pulse is quick and *full,* not quick and *wiry* (small and hard), as in the other disease.

Principles of Treatment.—In enteritis, owing to the presence of inflammation, the muscular coat of the intestines is unable to contract; hence a purgative, which acts by exciting the bowels to contract, and thus

hastens the expulsion of the food, etc., would be powerless to effect the removal of offending substances. Besides, when the intestines are thus affected, their blood-vessels are in a painfully distended condition, which a purgative would but aggravate, on account of the irritation it would set up by drawing blood to the already inflamed part. The administration of a strong sedative to allay the pain which threatens the life of the animal, and to allow him to "tide over the attack," is indicated. Belladonna is of special use, as it is not alone a sedative, but also tends to lessen congestion. Linseed oil may be given as a soothing and lubricating agent.

Treatment.—Give $\frac{3}{4}$ oz. of extract of belladonna, $\frac{3}{4}$ oz. of opium, or 6 oz. of tincture of opium.

The body may be fomented with warm water, and an enema of the same fluid at 100° F. may be given.

During convalescence, care should be observed concerning the horse's food, which may consist of small quantities of bran and linseed mashes, with a few scalded carrots and a little grass after a time. Dry food should be avoided.

Inflammation caused by the eating of sand.

When horses are bedded down with sea sand, or with river sand which contains saline matters, they are very liable to eat large quantities of it, and, consequently, to suffer from a most dangerous form of inflammation of the intestines. Many instances are on record of troop horses having become thus affected on being picketed on sand.

In some cases morbid appetite may account for the propensity. A certain proportion of healthy horses will always, particularly if they have not had a free supply of salt, eat sea sand when bedded down with it.

The precautions to be observed are obvious.

Horses have been known to eat, with, naturally, fatal results, quantities of 80 lbs. and upwards of sand.

The *symptoms* are intense colicky pains, and the passage of sand with the dung.

The *treatment* consists of keeping the animal on mashes and boiled food, through which about four ounces of linseed oil should be mixed at each feed; while the pain should be allayed by 2 oz. doses of tincture of opium given in a pint of water. No attempt to get rid of the sand by purgatives should be made, for if this be done, the gritty particles, on becoming forcibly impelled through the bowels, would wound them, and, conseqently, would set up inflammation to an almost certainly fatal degree.

Superpurgation.

Causes.—Giving too strong a purgative. Giving a second purgative before the first one has commenced to act. Exercising the horse before or soon after the physic has "set." (Physic is said to "set" when the purging ceases and the dung begins to assume its natural appearance.) Administering physic without preparing the animal for it. Allowing him to drink a quantity of cold water shortly after getting physic. Giving physic on an empty stomach and then keeping him without food, &c.

We may learn a useful lesson from the following extract from Professor Williams' work:—"It is a fact that the longer a purgative is retained in the body, the greater the danger from its superaction."

Symptoms.—Frequent purging. Loss of appetite. Debility. Weak pulse. The dangerous symptoms are—offensive breath; bad smell from the evacuations; glassy eyes; and distention of the belly with cessation of purging, for here the bowel loses the power to perform its natural movements on becoming inflamed. Laminitis frequently results from superpurgation.

Treatment.—If the horse looks lively and retains his appetite, the action of the physic should not be checked further than by keeping him warmly clothed, quiet, and allowing him only small quantities of thin gruel made from flour or rice, or boiled milk to drink, care being taken that the milk, if it be used, is not smoked in the slightest. On no account give linseed or roots, as they are laxatives.

If the horse gets worse, or if symptoms of colic appear, foment the belly with hot water, and give 2 oz. of tincture of opium in a quart of rice or starch water; water boiled with a little flour to a like consistency will do. If this does not afford relief, repeat, after a couple of hours, the tincture of opium and rice water combined with 1½ oz. of sweet spirits of nitre. If the horse be very weak, a bottle of port wine may be given. If neither opium nor its tincture be at hand, substitute for them camphor in 2-drachm doses. To support the strength give boiled milk with eggs beaten up in it. (*Williams.*) In superpurgation, a few bruised oats and

dry bran with some well-preserved hay may be given from time to time, and are useful to stop the purging. Bran mashes should not be given, as bran in that form is a laxative.

If distention of the abdomen appears, give 2 oz. of turpentine in a pint of gruel.

During convalescence the patient should be very carefully and gradually brought on to his ordinary food; and he should be kept quiet and free from excitement, as any unexpected or unusual noise or bustle may bring on a fit of purging.

Diarrhœa.

Many horses, more particularly slack-loined, slight, "washy" animals, purge if excited by exercise; or, if racehorses, by being brought on to a racecourse. Such animals are often liable to diarrhœa from trifling changes of food or of temperature. Diarrhœa may be simply an effort of nature to expel some irritating matter from the bowels; in which case it should on no account be prematurely checked. It may be due to worms, or to working the horse soon after he has drunk a large amount of water subsequent to a long abstinence from it.

In India, horses frequently get diarrhœa from being fed on an excess of gram, a grain almost identical in composition with peas. The derangement here is due to there being more albumen in the food than the system can assimilate. A cure may be rapidly accomplished by giving a few bran mashes, followed by a consider-

ably decreased supply of gram, which may be mixed with dry bran, bruised oats, or boiled barley and dry bran.

"Washy" horses that are inclined to scour should, as a rule, be fed on bruised oats in preference to any other grain. A limited proportion of beans may be used with advantage.

3 lbs. or 4 lbs. of dry bran, divided between the four or five feeds which a horse gets daily, will have a binding effect; while linseed and bran mashes will aid in allaying irritation. Sir Frederick Fitzwygram remarks that "to horses predisposed to scour, water should be given frequently and in reduced quantities, and in winter the chill should be taken off by mixing it with a very little warm water. Perhaps the best plan is to leave water always before such horses, because when so supplied, they drink less than when watered at intervals. . . If the reduction of the quantity of water does not produce the desired effect, it may be mixed with a little wheaten meal. . . . Horses disposed to scour should be stinted of their water before going to work. Some horses will scour unless a little hay be given to them in the morning before they are watered."

These horses should always have hay in the stall at the same time as they are consuming their allowance of corn, in order to induce them to vary the corn with the more bulky food, so as to comply with the well-known law that the food of the horse must have a certain bulk in order to adequately fill his intestines, which are of large volume.

Professor Dick, in his "Veterinary Papers," remarks that "the digestive organs of the horse, like the ox, &c.,

are very capacious, and are evidently intended to take in a large proportion of matter containing a small proportion of nutriment. And if the food, therefore, upon which they are made to live is of too rich a quality, there is, by the excitement produced, an increase of the peristaltic motion [worm-like action of the intestines] in order to throw off the superabundant quantity which has been taken into the stomach and bowels. It is necessary to give, therefore, a certain quantity or bulk, to separate perhaps the particles of nutritious matter, that the bowels may be enabled to act properly on it."

If the horse be a greedy feeder he should have some hay before each feed.

The oats given should always be bruised, for in that state they will require a more thorough mastication than when whole; besides, the hard husk, which might have an irritating effect on the intestines, will become broken up.

The corn should be given from a trough or sheet placed on the ground, so that the animal may be obliged to take a considerable time over its consumption.

In cases where the diarrhœa is brought on by improper food, give a pint of linseed oil and attend carefully to the diet. Instead of plain water, give rice water, or thin flour gruel. Give bruised oats and dry bran. Keep the horse warmly clothed and comfortably stabled. If the horse's mouth has a sour smell, give 2 oz. of bicarbonate of soda (baking soda) in his food daily. If the case does not yield to these simple measures, give once or twice a day, after purging, an

ounce of tincture of opium in a pint of rice water. If this fails, administer the following ball :—

Powdered opium	-	-	-	1 drachm.
Powdered catechu	-	-	-	2 drachms.
Prepared chalk	-	-	-	4 ,,

Treacle enough to make up into a ball.

A little port wine, spirits and warm water, or ounce doses of sweet spirits of nitre may be given now and then if the horse be very weak.

One should always be careful not to administer too much physic, nor to check the diarrhœa suddenly by medicines when milder means might suffice.

The not very uncommon practice, among horse dealers and grooms, of giving arsenic to improve the appearance of the skin, tends to cause corrosion of the coats of the intestines, and to render the animal liable to diarrhœa.

Indigestion.

The usual causes of indigestion are—improper food ; an improper system of feeding and watering ; imperfect chewing of the food by the animal, owing to bad teeth, or to its being given in such a form that he bolts it ; constitutional tendency ; and injudicious use of medicines. In young animals, according to Professor Williams, it is generally caused by draughts of cold milk, by removal from the dam at too early an age, by sucking at rare intervals, or when the dam is heated by work.

Symptoms.—The animal loses condition. His appetite is generally capricious and depraved. There is

often acidity of the stomach, as is evinced by his grinding his teeth, and by his partiality for licking white-washed walls. He may crib-bite or wind-suck. The mouth has a sour smell. Cough often accompanies indigestion. The coat is out of order, being "hide-bound," dry, lacking its natural gloss and being filled with dandruff. Frequently the horn of the hoofs becomes shelly and brittle. These conditions are due to the sympathy which exists between the skin, the sensitive laminæ of the feet, and the mucous membrane which lines the alimentary canal. The dung, owing to the absence of a proper supply of bile, which is a powerful deodorizer, has a very foul smell. It is composed of imperfectly digested materials, the hay and corn being passed in a more or less unaltered condition. Hence the dung loses its natural healthy colour and appearance. "In the stable, the horse is mostly inclined to be costive ; but when taken to work or exercise is soon excited to purge." (*Percivall.*) He is often subject to colicky pains, especially some short time after being fed. The abdomen is frequently distended with gas, owing to the digestive organs being unable to take up what they require of the nutritive part of the food and to expel the remainder before it decomposes, which it quickly does, when, through derangement of the liver, the supply of bile, whose presence checks decomposition, is curtailed.

Treatment.—Beyond advising the reader to avoid the causes of indigestion, I have little to say regarding its cure, which is chiefly a question of diet and stable management. A pint of linseed oil may be given as a

drench once a week. Mix through the daily allowance of food 2 oz. of the bicarbonate of soda, which is not alone an antacid, but is also a sedative to the mucous membrane, while it assists the liver in the removal of deleterious matter from the blood. Not more than 7 or 8 lbs. of corn, of which half may be principally of dry bran, should be given ; while the horse should have a liberal though judicious supply of carrots and green food. Much benefit is often obtained by allowing the animal, if he chooses, to eat earth, which may be supplied to him along with fresh-cut sods. He should have the free use of salt, say 2 oz. a day in his food, or he may have a lump of rock salt, to lick when he likes, in his manger. If there be debility, give vegetable tonics, such as ½ drachm of nux vomica mixed through the food twice a day, or a quart of ale with two drachms of gentian or chirretta twice a day. If the action of the liver be suspected to be at fault, give daily in a ball a drachm and a half of powdered ipecacuanha for five or six days.

Medicine in this disease should be employed very sparingly. The horse should be warmly clothed, carefully exercised, and well groomed in order to set up a healthy action of the skin, so that, by sympathy, the mucous membrane of the intestines may be beneficially influenced. In winter, clipping the coat has often a good result.

When everything else fails in restoring the horse to health, try the effect of a run at grass, not forgetting to allow him a supply of salt.

Constipation.

Causes.—Natural tendency. Constitutional weakness. Feeding on too much dry and innutritious food. Paralysis of the bowels, &c. "One symptom of paralysis of the bowels is diagnostic, namely, the absence of intestinal murmurs. Another may be mentioned of not unfrequent occurrence, especially if the paralysis be in the lower intestines, namely, a dilated, dry, and non-contractile condition of the rectum, which feels, when the hand is introduced, as a large cavity with passive walls." (*Williams.*) The intestinal murmurs in the healthy horse may be heard on applying the ear to the side of the belly.

Treatment.—Put the animal on green food and bran mashes. Backrake. Give a couple of enemas of cold water. Administer a quart of linseed oil as a drench. If no effect be produced in twenty-four hours, repeat the oil, with the addition of 15 minims of croton oil, and also repeat the enemas. If the belly be distended with gas, give 2 oz. of turpentine along with the oil. If the constipation still remains unaffected, give a drachm of extract of belladonna, which may be repeated two or three times with intervals of four hours. The belladonna may be made up into a soft mass with treacle, and placed between the horse's back teeth, so that he may gradually swallow it. In urgent cases, accompanied by pain, give ½ oz. of belladonna. If the bowels appear to be paralyzed, give ¾ drachm of nux vomica twice a day, not forgetting to give full doses of oil.

Intestinal Worms.

There are two kinds of worms commonly met with in the intestines of the horse :—1. Round worms (*ascaris megalocephala*), which are very like earth worms. They generally reside in the small intestine, though they are sometimes met with in the stomach, their presence in that organ usually causing great derangement. When these worms infest the horse in considerable numbers, he falls away in condition, while his general health is more or less affected, which fact may be evinced by a morbid state of the appetite, rough coat, pot belly, &c. On account of the irritation due to the presence of these parasites, mucus often comes away with the dung.

2. The second kind, or thread worms (*strongylus armatus*), are thread-like parasites about an inch and a half long, and are generally found in the rectum—the large straight intestine terminating at the anus—though sometimes higher up in the colon, or cæcum, which are portions of the large intestine. Their presence produces little disturbance of the animal's general health, although it may cause irritation about the dock, which is evinced by the horse rubbing his tail. Accompanying this irritation, a lightish yellow waxy substance—eggs of the parasite—will be found adhering to the skin immediately below the anus.

Tape worms and others which have not been already mentioned, are met with, though very rarely, in the horse. The principles to be attended to for their

removal differ in no wise from those to be observed in treating the animal for the two more common kinds.

Worms are much oftener found in young than in aged horses.

In the removal of these parasites two conditions must be attended to,—1. Their destruction or expulsion. 2. After their ejection, the employment of "means calculated to restore the digestive organs to a healthy state, and to correct that peculiar condition of them (*helminthiasis*) which promotes the generation of intestinal worms. The means best calculated for this purpose are—keeping the body warm by proper clothing, a light but nutritious diet with a moderate use of common salt, and at the same time the administration of bitter tonics with gentle aperients, and, if anæmia [deficiency and poverty of the blood] be present, the preparations of iron." (*Neligan's Medicines.*)

The best treatment for round worms consists in giving 1½ drachms each of tartar emetic and sulphate of iron in the horse's food every day for a week, and then administering a purgative, keeping the animal in the meantime on bran and hay: although this diet will weaken him for a short time, still it will also affect the parasites, and induce them the more readily to quit the intestines. Tartar emetic, whose effect is but slightly depressing on the horse, even when given in very large doses, appears to have a most nauseating influence on the parasites, which readily come away when subjected to its influence. In bad cases, a second course of tartar emetic and sulphate of iron, followed by a physic ball, may be tried after an interval of a week. After

this, the animal may get (if in India) an ounce of finely powdered chiretta in his food twice a day, or a drachm of sulphate of iron every day for a fortnight or three weeks.

For threadworms, give an enema of warm water to clear out the rectum, and then another enema of six or eight ounces of oil of turpentine in a quart of linseed oil.

Turpentine is a most valuable vermicide; it should be given in full doses, for in small ones it is a diuretic. It should be repeated only at long intervals. Owing to its irritating effect on the mucous membrane, it should be given in oil, which is also a vermicide in that it clogs up the skin of the worms through which they breathe. The usual dose is three to four ounces in a pint of linseed oil.

Turpentine causes death to the parasite on contact, which readily takes place owing to its being volatile.

The free use of common, or rock salt, is perhaps the best preventive against an attack of worms in the horse: its action, in this respect, is probably due to the beneficial effect it exerts on the animal's general health.

Bots.

During the autumn months the gadfly seeks to lay its eggs on the front of the fore-legs, chest, and sides of horses it meets in the fields. It appears to instinctively choose those positions which are in reach of the animal's tongue. The presence of these small yellow

eggs causes itching of the skin, so that the animal is induced to lick with his tongue the parts to which they adhere. The eggs, on being hatched, produce small maggots, which are, in this way, conveyed into the stomach, to which they adhere by means of hooks that enable them to maintain their position until they arrive, after about eight months, at a state approaching maturity. The larva then loses its hold on the mucous coat of the stomach, and is expelled with the dung. It becomes subsequently converted into a gadfly.

No *treatment* is necessary, as the presence of bots in the stomach seems to have little hurtful effect on the horse ; besides this, medicines are powerless to dislodge the larvæ, which readily come away at their appointed time. If they irritate the horse by adhering to the orifice of his anus, he may get as a drench 1¼ pints of linseed oil and 3½ oz. of turpentine, while the inside of the anus may be smeared round with a little mercurial ointment.

Crib-biting and Wind-sucking.

As these stable vices are connected with derangement of the organs of digestion, I have classed them under the present section of diseases.

The crib-biter is one that has acquired the habit of seizing with his teeth the manger, or other convenient object, and while holding it he endeavours to belch out air from his stomach.

" A wind-sucker smacks his lips, gathers air into his mouth, extends his head, or presses it against some

solid body, arches his neck, gathers his feet together, and undoubtedly swallows air, blowing himself out, sometimes to a tremendous extent." (*Williams.*)

The crib-biter, from practising his favourite vice, generally wears away in time the outer edges of his centre and lateral incisors (front teeth).

These habits, especially wind-sucking, cause impairment of the digestion, and consequently affect the general health and condition. They are both unsoundnesses.

Causes.—Idleness; indigestion; imitation, and irritation from teething.

Treatment.—Attend to the animal's general health as directed under "Indigestion." The crib-biter may be fed from a sheet placed on the ground, and all objects which he can grasp with his teeth may be removed from the stall; or they may be covered with some substance which he will not bite, such as that used for making iron wire mill sieves, or rope made of coarse fibre. An admirable material, to be used for this purpose in India, is (as recommended to me by Mr. Anderson, V.S.R.A.) *moonj* rope covered with cow-dung. Or we may use, during the intervals between feeding-hours, a bar muzzle, which, while checking the vice, will allow the horse to eat his hay.

The crib-biter may be picketed in his stall by one fore-leg in front, and by the opposite hind leg behind, instead of being tethered in the usual manner, by a rope or chain to his headstall.

To prevent wind-sucking, a strap may be kept buckled round the neck, sufficiently loose to admit of

food and water being readily swallowed, but tight enough to prevent the animal from swelling out his throat in his endeavours to gulp down air. For the same purpose, a strap with sharp spikes may be used. These appliances may be procured from any saddler.

Leaving a constant supply of water for the windsucker in his stall will often cure him of his peculiar vice.

Horses addicted to either vice may have a lump of rock salt (weighing, say 2 lbs.) placed in their stalls to lick, as well as a constant supply of water.

Mr. Armatage states that he has never known a hard-working horse to become a windsucker or cribber.

Lampas

Is a swollen condition of the palate of the horse, so that it projects below the level of the front teeth. It is usually met with in the young animal, owing to the presence of the large supply of blood which is required for the growth of his teeth. It may be caused by cold, indigestion, &c. As lampas, except when it occurs from teething, is merely a symptom of derangement, the part should not, as a rule, be interfered with in any way—a couple of bran mashes with half an ounce of nitre in them, or a mild dose of physic, being all that is generally necessary. If the horse "quids" his food, and it is not convenient to throw him by for a few days, the palate may be lightly scored with a lancet or penknife, care being taken not to wound the artery which lies underneath, and then rubbed

with some powdered salt. Bathing the part with a strong solution of alum and water may be sufficient, without lancing it.

Aphthæ

Are small vesicles which break out in the mucous membrane of the tongue and mouth, and are subsequently converted into superficial sores.

Treatment.—Wash the mouth out, from time to time, with a solution of borax or of alum in water. Give a few bran and linseed mashes, and mix through the daily allowance of food 2 oz. of the bicarbonate of soda. Both the linseed and the soda have a well-marked soothing effect on the mucous membrane.

CHAPTER XIV.

Diseases of the Urinary Organs.

RETENTION OF URINE—BLOODY URINE—DIABETES OR PROFUSE STALING—INFLAMMATION OF THE BLADDER (CYSTITIS) AND STRANGURY—ALBUMINOUS URINE.

Retention of Urine.

This affection is generally caused by spasm of the neck of the bladder; by paralysis of the bladder; by the accumulation of hardened soapy matter in the sheath, owing to neglect of cleanliness; by the horse having been kept too long from staling, and by chill. It may also be due to the presence of stone in the bladder or urethra (the canal by which the urine escapes), and to other causes affecting these parts. It may accompany colic and other diseases. Although in colic there may be retention, still when suffering from it the animal does not make such frequent attempts to stale as he does when attacked by the ailment under consideration.

"The symptoms are frequent and ineffectual attempts to urinate; if standing, the animal will stretch itself out, strain violently, and groan with pain, discharging but a few drops of urine, or none at all. Examination *per rectum* will enable the practitioner to feel

the distended bladder with the hand, and this distention of the bladder is the diagnostic symptom." (*Williams.*)

Treatment.—Pass a catheter. If this instrument be not available, foment the loins; give an enema of warm water in which half an ounce of opium has been boiled; clothe warmly; give a pint of linseed oil, and after that the following ball:—

Opium - - - - -	1½ drachms.
Camphor - - - -	2½ ,,

Repeat the ball if after an hour or two the horse has not staled. When he has done so, give linseed mashes and linseed tea.

Bloody Urine.

The dark or bloody colour assumed by the urine is usually caused by improper feeding, or by strains received during violent exertion. I knew a steeplechase horse that was always more or less affected in this manner after a race. Disease of the kidneys, irritation of the urinary passages, and the presence of calculi are also causes of bloody urine.

Treatment.—Put the horse on cooling food. Give linseed mashes, and substitute linseed tea for water as his drink. Give a mild dose of physic and two drachms of tincture of steel twice a day for a fortnight. In India, a decoction of the leaves of the *sissoo* or *seesum* tree is a favourite native remedy. About half a bucket-

ful of the leaves is taken, water is poured over them, they are mashed up between the hands, and are allowed to soak in the water for nine or ten hours; the fluid should be then strained off and given to the horse to drink. The mixture of a couple of handfuls of unrefined sugar (termed *goor* in Hindustanee) will make this drink palatable to him. This mucilaginous fluid acts as an emollient in soothing irritation.

The *rationale* of the foregoing treatment is as follows:—The purgative is given to allay inflammation of the urinary passages. The tincture of the terchloride of iron acts as an astringent in checking the flow of blood, while the linseed and sissoo are simply soothing agents.

If the urine be very dark-coloured without the presence of blood, we may generally conclude that this condition is due to too high feeding. The treatment should be a full dose of physic (aloes); cooling diet; half an ounce of nitre daily in the food or water; and linseed mashes at night. As the injurious substances, which accumulate in the blood from too high feeding, are gradually got rid of along with the urine, we give nitre in order to stimulate the kidneys, to remove them as quickly as possible out of the system.

Diabetes, Polyuria or Profuse Staling

Is, correctly speaking, a constitutional disease, but for the purpose of ready reference I have included its description in the present chapter.

Causes.—Improper food, such as musty hay and

corn. Excessive use of nitre and other diuretics. Feeding on boiled food for a considerable time. (*Williams.*) Diabetes may accompany indigestion and other disorders. Sometimes it appears before an attack of glanders. The form of diabetes observed in human practice, in which sugar is found in the urine, is unknown among horses.

Symptoms.—Both the thirst and the amount staled are excessive. There is rapid loss of condition; the coat is rough; the appetite depraved; the gums pale; the urine watery; the bowels are costive; and general debility quickly ensues. The dung is usually of a dark colour and of a bad smell.

Treatment.—Give a mild dose of physic; change the nature of the corn; instead of water give the horse linseed tea to drink. Mix in the food or water half an ounce of the hyposulphite of soda, which, being a deodorizer, will tend to neutralize the foul gas given off during constipation by the residue of the food which is in the lower part of the intestines, for this gas, if absorbed, might exercise a poisonous influence on the system; and give, soon after feeding, in a ball, from one drachm to one and a half drachms of iodine every day for six or seven days, exercising judgment in diminishing the iodine as the thirst and amount staled decrease.

Owing to the irritating effects of iodine on the stomach, it should never be introduced into it when that organ is in an empty condition. The almost specific (if I may use the term) action of iodine in this disease was first discovered by Prof. Dick. We may

understand its effects if we remember that in small doses it acts as a tonic to the kidneys; in fact, its action is specially directed on the glands, to which organs the kidneys belong; and as explained by Neligan in his work on Medicines, "under the continued use of small doses of this medicine, the removal or palliation of disease will sometimes take place without any perceptible action on the system generally. So far as I have observed, the deposition of fat is consequent on its administration in small doses; the absorbents are thus stimulated to moderately increased action, whereby food is more thoroughly assimilated, and the individual grows fat."

Dr. Evans (see the *Veterinary Journal* for September, 1877) advocates the use of clay water, which is made by mixing yellow clay with water, and after the sediment has been deposited, giving the solution to the animal to drink, instead of plain water. Sir F. Fitzwygram also recommends its employment.

Inflammation of the Bladder (Cystitis) and Strangury.

We may say that the only causes of this disease are the internal administration, or external application—as a blister—of cantharides, or croton; in both cases, the active principles of these drugs become absorbed into the system. Fatal consequences frequently occur from blistering "all round." In warm weather the urinary organs are more liable to become affected by blisters

than when the temperature of the air is low. The chief reason for this is, I think, that in summer, owing to the increased action of the skin, less urine is secreted, and consequently the irritating matter, being less diluted, cannot be removed from the bladder as quickly as when the amount of urine is abundant, as in cold weather. Besides this, when the temperature of the air is high, the absorbents take up the active principle of the blister more rapidly.

Mares, at certain seasons, owing to sexual causes, are very liable to this affection from blisters.

Symptoms—The lining membrane of the mouth—as indeed that of the whole intestinal canal—becomes red and inflamed. In the mare and horse there is sexual excitement. "The urine is voided frequently, and with difficulty and pain, as it is irritating and burning; it is highly albuminous; the fæces are covered with mucus and mixed with blood." (*Gamgee.*)

There is fever, pain, and excitement. If the symptoms be not alleviated, the disease will run a fatal course in two or three days.

Treatment.—If resulting from a blister, wash the blistered part with warm water, having some carbonate of potash dissolved in it. Give the horse linseed tea to drink, and put him on bran mashes. If he will eat, mix two ounces of the bicarbonate of soda in the food daily, or divide them between two or three drenches. Give the whites of a couple of dozen raw eggs now and then. Administer in a ball, three drachms of camphor twice a day. If there be great pain, give once or twice

in the day, 2 drachms of the extract of belladonna in a ball, or place it between the back teeth and allow it to gradually dissolve there. Opium should not be given.

Principles of Treatment.—Both the bicarbonate of soda and the linseed tea have a most soothing effect on the mucous membrane, while the sedative effects of camphor are well marked in cases of irritation of the urinary organs. The belladonna acts as a powerful sedative. The carbonate of potash forms a soap with the oily matter of any portion of the blister that may have remained on the spot, and thus aids in removing it. The white of egg is given as a soothing demulcent.

Albuminous Urine.

The existence of albumen in the urine arises generally from causes unconnected with actual disorder of the urinary organs, the removal of the cause being then the only treatment required. Albumen is often found in the urine after hard work ; and also during fatty degeneration of the kidneys (Bright's disease)—a very rare complaint among horses—the symptoms of which are stiffness in movement, and the continued practice by the horse of standing stretched out in his stall, as if he were about to stale. In this disease treatment appears to be of no avail.

To test for albumen in the urine, add a few drops of nitric acid to neutralize the fluid (as albumen is soluble in an alkali), and then boil it : if albumen be

present, a coagulum will be formed, which will remain unchanged on the addition of nitric acid, but will be dissolved by liquor ammoniæ. I may remark that, during life, the fluidity of the blood is dependent on its alkalinity. Were the blood to become acid or neutral, death would be the immediate result.

CHAPTER XV.

Constitutional Diseases.

SIMPLE FEVER—MALARIOUS FEVER—INFLUENZA—PINK EYE OR EPIZOOTIC CELLULITIS—CHEST INFLUENZA — PURPURA — HORSE PLAGUE, ANTHRAX, OR LOODIANA FEVER—AZOTURIA—RHEUMATISM—GLANDERS AND FARCY—MELANOSIS—WEED, OR LYMPHANGITIS.

Simple Fever.

Although the existence of simple fever is not generally recognised in England, it is common in India and in other hot countries. The usual causes are exposure to the heat of the sun, imperfect ventilation of the stable during hot weather, and chill. High feeding and want of exercise are strong predisposing causes to this complaint. Well-bred horses resist the effects of the sun far better than those of coarser breed. This is well seen in the case of Australian horses in India. Dark-coloured horses stand the sun with much greater impunity than grey horses, the most susceptible of all being greys with pink skins. It may not be out of place if I remark that in tropical climates, during hot weather, there should be a free current of air through the stalls, and on no account should a dead wall be allowed to interfere with the passage of air, under the mistaken idea that it keeps out the hot wind.

Nature of the Disease.—When a horse suffers from this kind of fever, his blood becomes loaded with the various impurities which result from waste of tissue. In health these impurities are eliminated from the system by the various excretory organs, such as the kidneys, liver, lungs, bowels and skin, with sufficient quickness to obviate any ill consequence which might ensue from their undue retention. Hence our treatment should be directed to stimulate these excretory organs, and to get them into proper working order. As the blood is the vehicle by which these impurities are removed from the body, and as they are received into the blood in a dissolved state, it follows that the more fluid the blood is, the more readily will it part with them. Epsom salts causes watery evacuations by exciting the blood-vessels of the intestines to pour out their fluid contents. Nitre stimulates the kidneys, while sweet spirits of nitre causes the kidneys and skin to act, and relieves the existing debility by its general stimulating effects. We should remember that before a medicine can act on the system, it has to be taken into the blood. Nitre and Epsom salts appear to cause the blood to take up an increased supply of water, and, consequently, to become more fluid.

Symptoms.—Dulness ; loss of appetite ; skin hot and dry ; forehead hot, indicating headache ; pulse quick ; breathing accelerated, and rise in the internal temperature.

Treatment.—Put on mash diet and green food. Have free ventilation in the stable, or remove the animal to some airy situation, where he will be well protected

from the rays of the sun. Sponge his coat over lightly with vinegar and water now and then. If there be great heat about the forehead and temples, cover them with wet cloths. In India, if the weather be very sultry, employ a couple of men with large hand fans ("punkahs") to keep the horse cool. If he be gross, and has been highly fed and little worked, give a dose of aloes in a ball, and half an ounce of nitre daily, in his mash, for a few days. But if the fever has not been induced by high feeding, give either of the following drenches in a bottle of water two or three times a day until the attack wears off:—

Sweet spirits of nitre - -	1 ounce.

Or—

Sweet spirits of nitre - -	½ ounce.
Aromatic spirits of ammonia -	½ ,,
Solution of acetate of ammonia	2 ounces.

Or—

Nitre - - - - - -	1 drachm.
Sweet spirits of nitre - -	½ ounce.
Carbonate of ammonia - -	½ drachm.

If these medicines be not procurable, give ¾ ounce of nitre, or 3 ounces of Epsom salts daily in the food or water. The attack generally passes off in two or three days, and often leaves the animal much debilitated; when this is the case, feed him liberally, attend to his exercise, and give him a couple of quarts of beer a day, and a drachm of sulphate of iron in his food daily, or, if in India, a couple of ounces of chiretta.

Malarious Fever.

In certain malarious parts of India, such as Lower and Eastern Bengal, horses not uncommonly become affected, at certain seasons of the year, with a low type of fever, in which there is extreme debility, and loss of appetite and condition. The pulse is feeble and oppressed, though usually without any very marked acceleration. I have never observed any other signs of ill-health except a rise in the internal temperature. The symptoms do not appear to alternate in the same manner as they do in the intermittent fever of man. Cases of this fever not unfrequently terminate fatally.

From recent investigations it appears that malarious fever is caused by the entrance into the blood of microscopic germs of a vegetable origin, which are akin to the rod-like bodies that produce anthrax or Loodiana fever. Assuming this to be the case, we may readily understand that quinine, which is a powerful antiseptic, on being absorbed into the blood, acts by checking the development of the germs which may have gained access to that fluid. The antiseptics, arsenic and carbolic acid, have a like effect. As quinine is a much safer medicine than the other two, it should, if expense be not an object, be preferred to them. The antiseptic should be given in large doses at first, and then gradually decreased, for if the opposite to this be done, we may acclimatize (if I may use the word) the parasites, so that the drug will be comparatively powerless to affect them. Men in India who commence taking quinine in small doses for

fever, frequently find that after a time it loses all power to check the disease.

The *treatment* may consist in giving the horse ½ oz. of quinine twice a day for the first two days, and then gradually diminishing it down to 1 drachm twice a day at the end of a week, when it may be discontinued. Or he may get 1½ drachms of carbolic acid in ½ pint of linseed oil twice a day for three days. Give 1 oz. of sweet spirits of nitre two or three times a day as a drench. Allow laxative food, such as carrots, grass, and bran mashes, with some boiled barley. If quinine be used, give 4 oz. of Epsom salts daily as a drench. Owing to the rapid waste of tissue from the increased internal temperature, it is necessary to keep the skin, bowels, and kidneys in good working order.

Influenza.

Influenza is the convenient but unscientific term employed to denote an epidemic fever which occurs under various forms. At times the lungs are the chief points of attack; on other occasions, symptoms of catarrh (cold in the head) are best marked. Influenza is to be distinguished by its epidemic character, by the suddenness of its attack, and by the extreme debility shown by horses affected with it. We must regard it as a disease which has a certain but ill-defined course to run, so our efforts should be directed not in vainly trying to cut short its course, but rather to smooth the way for the vital powers of the animal to overcome the poisonous effects which the epidemic exercises on the

system. As the type of influenza constantly changes, I shall content myself by describing two common forms, and by indicating their proper treatment.

The acute stage runs its course in about a week.

Influenza appears to be contagious, and seems to be propagated by some poisonous matter contained in the atmosphere at the time. Its ravages are often very extensive. Bad sanitary conditions to a certain extent favour the spread of this disease. The first form we will consider is—

Pink Eye, or Epizootic Cellulitis.

This epidemic, or rather epizooty, receives its common name from the pink appearance assumed—when an animal is suffering from it—by the membrane (the conjunctiva) that lines the insides of the eyelids. It is considered by Professor Williams to be inflammation of the cellular tissue; hence the term cellulitis which he has given to it. We see this loose open tissue between the muscles and the skin on removing the latter from the body of any animal. It also surrounds the fibres of the muscles: thus the difference between the coarse and the fine grain of meat depends on the greater or less quantity in it of this cellular tissue.

This disease was very prevalent in Edinburgh during the months of January and February, 1877, and was ascribed by Professor Williams, and by other experienced veterinary surgeons, to the saturation of the ground with water, owing to long-continued wet weather. In support of this theory there is the significant fact that cases were, comparatively, very rare

indeed in stables whose floors happened to be waterproof from being covered with cement.

It is probable that, like anthrax fever, influenza is caused by the entrance into the blood of certain vegetable disease germs, whose development, before they are taken into the system, is assisted by the presence of moisture.

The great danger to be dreaded in this disease is the formation of clots in the blood-vessels. In fact, we may often find a horse, when doing well to all appearance, die suddenly, the formation of a clot in the heart being the cause of death. I may here explain that in the living body healthy blood always remains fluid, but when removed it rapidly forms clots, which are caused by the coagulation of the fibrin whose constituents were previously held in a state of solution. This coagulation or clotting of the fibrin may also take place in disease, the conditions which induce its occurrence being debility of the heart's action and an excess of fibrin in the blood. In this complaint, the action of the heart is extremely weak, while there is an excess of fibrin, as there is in all inflammatory diseases. I need hardly point out that our remedial means should be chiefly directed to prevent the formation of these clots.

During an epidemic, as might be supposed, influenza is generally much more prevalent and virulent in dirty, damp, ill-ventilated stables than in those enjoying good sanitary conditions.

Symptoms.—The symptoms vary in different epidemics, as well as in different periods of the same epidemic, and also in individual cases. There is always great debility ;

stiffness of the limbs and body at first, and a pink appearance of the insides of the eyelids. We generally find that the eyelids swell, and that there is a flow of tears from the eyes. The pulse is usually oppressed and very quick. There is great dulness—in fact, the animal is generally in a more or less semi-unconscious state. There is usually constipation of the bowels, but those cases in which we have spontaneous diarrhœa or profuse staling recover far more rapidly than the others. There is generally swelling of the limbs and joints; when this however appears, the pain subsides. Sometimes there is great lameness, as if from inflammation of the feet. Occasionally cough and soreness of the throat are present. Sometimes symptoms of inflammation of the lungs appear. An attack is often preceded by colicky pains.

The fact of the pain subsiding on the appearance of swelling of the limbs, strongly supports the supposition that an inflammatory state of the cellular tissue which surrounds the fibres of the muscles is the cause of the great pain, and that the extreme stiffness arises from the natural disinclination the animal has to moving the muscles through which the inflamed tissue is distributed.

If properly treated this is by no means a fatal disease.

Treatment.—Reasoning from the fact already stated, that cases in which spontaneous diarrhœa or profuse staling appears, rapidly recover, we may naturally conclude that the best plan of treatment is to promote these actions: hence, if diarrhœa be not present, give—

Linseed oil - - - -	8 oz.
Turpentine - - - -	1 oz.

After that give half the above dose every ten or twelve hours, and half an ounce of nitre in the food or water daily. If linseed oil be not available, give 3 drachms of aloes in a ball, and give the turpentine in a quart of gruel.

Or, give ½ pint linseed oil, followed by—

Carbonate of ammonia - -	2 scruples,
Nitre - - - - -	1½ drachms,
Water - - - - -	1 pint,

three times a day.

Either treatment may be continued for three or four days, or until the severity of the symptoms abates.

We should not be deterred from giving a laxative by the great existing debility, which will be relieved as soon as the bowels begin to act. This seems to indicate that the debility is caused by the presence of some deleterious matter in the blood. As the bowels in this disease are very susceptible to the action of purgatives, we should consequently use them in small doses.

Let us now glance at the action of the medicines recommended. The turpentine is an astringent, diuretic and stimulant. As an astringent it acts on the walls of the blood-vessels, while its stimulating effect is most useful in combating the great debility. That the walls of the blood-vessels have, to a certain extent, lost their tonicity, is shown by the swelling of the eyelids and legs caused by the fluid part of the blood transuding through the walls. Both the carbonate of ammonia (a powerful diffusible stimulant) and the nitre (a diuretic)

appear to have a well-marked action in retarding the coagulation of the blood, hence their use in preventing the formation of clots.

If there be soreness of the throat, neither give carbonate of ammonia nor turpentine, as either medicine would irritate the throat, and would thus greatly distress the animal; but simply give $\frac{1}{2}$ pint of linseed oil as a drench and mix $\frac{1}{2}$ oz. of nitre in the food or water daily.

Owing to the debilitated state of the animal, and to the danger of blood-clots being formed, aconite should on no account be given, as it is a sedative to the heart's action.

The horse should be put into a well-ventilated box, with plenty of warm clothing on; and should have as much water as he likes to drink.

At the commencement of the attack the food should be of a laxative and cooling nature, and may consist of fresh green grass, lucerne, carrots, bran and linseed mashes, and such like articles of diet. If necessary, the horse's strength should be kept up by two or three quarts of ale or stout a day.

The second form of influenza to which I wish to direct the attention of my readers is what I shall, for convenience sake, call—

Chest Influenza.

In it the symptoms of pleurisy are, sometimes, well marked, at other times those of bronchitis, with painful cough, running from the nose and eyes, and soreness of the throat. Often, from inflammation, the

surface of the eyes assumes an opaque appearance. There is frequently swelling of the glands of the throat, and dropsical swellings of the legs, belly, and head. Often, when the difficulty of breathing is great, the horse is, from non-oxidation of blood, almost in a state of coma. Sometimes, when the animal is recovering from an attack, rheumatism sets in, or the liver becomes affected, as will be evinced by the yellow appearance of the gums and of the insides of the eyelids.

The treatment to be pursued should be of an alleviative nature, aided by careful nursing, warm clothing, fresh air, plenty of water to drink, fomenting the sides, steaming the nostrils if there be a discharge, stimulating the throat if it be sore; or, if there be a cough, by giving half an ounce to an ounce of nitre in the water daily, while little or no more medicine should be employed. For further directions see Chapter XI.

N.B.—On no account give aconite, which has a depressing effect on the system, due to its sedative action on the heart, as this epidemic is accompanied by extreme debility.

Purpura Hæmorrhagica

Appears to be a form of blood poisoning, due to the introduction into the system of some *virus* produced under conditions of bad drainage, want of ventilation, &c.; or generated within the body during previous illness; or it may be caused by some constitutional taint or weakness.

Nature of the Disease.—During health, the watery and colourless portion of the blood, which contains all the elements for building up the various tissues, constantly oozes, to a limited extent, through the very thin walls of the small blood-vessels (the capillaries) which connect the arteries and veins together. The various parts of the body are thus supplied with materials for repairing the wear and tear they undergo.

In this disease, the walls of the blood-vessels appear to lose their natural strength and firmness, so that, instead of restraining within due bounds the oozing of this watery fluid, they allow it to take place to such an extent that it accumulates, by its own weight, about the legs, head, under parts of the belly, &c., producing the characteristic swellings ; while its infiltration into the brain causes insensibility, and into the lungs, suffocation. The fluid which thus escapes is more or less mixed up with the colouring matter of the blood, which causes the various tissues, into which the fluid flows, to become stained ; hence the name purpura hæmorrhagica.

We may reasonably assume that the treatment here indicated is removal of the poisoning matter from the system, and of the accumulated fluid by means of a purgative, and by diuretics, such as turpentine. We may also, by the use of turpentine, which is an astringent, cause the walls of the blood-vessels to contract, and thus to regain their natural strength. The turpentine probably tends to check the morbid change which the blood undergoes in this disease. Turpentine being a stimulant is of undoubted benefit in overcoming the great debility which accompanies this complaint.

The linseed oil, besides being a laxative, serves to prevent the turpentine irritating the inside of the mouth, gullet, &c.

The following description of this disease has been kindly placed at my disposal by Mr. A. Johnston, M.R.C.V.S.

Symptoms.—The first symptoms are prominent swellings of about the size of a florin, usually on the inside of the thighs, and dark red spots on the mucous membranes of the mouth and nostrils. The bowels are generally constipated, and the dung is usually covered with mucus and blood. The prominences on the legs soon run together, causing swellings of the limbs, which swellings terminate abruptly on the thighs or fore-arms. The lips and nostrils then swell, the distention terminating, at any part of the head, in the same abrupt manner as it does on the extremities. The eyelids generally swell. There is a thin, gluey, bloody discharge from the nostrils; this, accompanied by swelling of the throat and head, often renders tracheotomy imperative. The horse can usually swallow well. There are swellings of the sheath, belly, and breast, which generally terminate on the same level as that of the legs. The fluid now, from the giving way of the vessels, begins to ooze through the skin, and is more or less mixed with blood. Death occurs from gravitation of the fluid into the lungs, and from debility.

The horse begins to become comatose as soon as the general swelling commences to appear, and he becomes more and more insensible to outward impressions as the attack advances.

Treatment.—If the sanitary conditions of the stable be bad, remove at once, if possible, to a healthy, well-ventilated box. Give—

Oil of turpentine - - - -	1 oz.
Linseed oil - - - - -	$1\frac{1}{4}$ pints.

From the outset the strength should be supported by giving gruel, stout, or ale, &c.

Continue—if the symptoms indicate the necessity—giving 1 oz. doses of turpentine three times a day, but after the first dose give only 4 oz. of linseed oil with the turpentine.

Give the animal plenty of cold water to drink, and, if constipation be present, administer enemas of warm water. Allow the horse gruel to drink, and any green-meat he may like to eat. Keep him warmly clothed. To support his strength nothing is better than two or three quarts of stout a day. If the breathing become difficult, tracheotomy should be performed.

On no account puncture the swellings, as the wounds thus made are apt to cause extensive sloughing. Besides this puncturing them does no good.

Horse Plague, Anthrax, or Loodiana Fever.

This disease is widely distributed over the world. It is comparatively rare in England. It is not uncommon throughout India, where it is known as Loodiana fever. It is frequently met with on the Eastern frontier

of Bengal, particularly among the ponies of the Munipur country.

It is not confined to horses, but also attacks cattle, buffaloes, sheep, pigs, elephants, deer—in fact, all animals which feed on herbs.

Symptoms.—The horse, with little or no warning, becomes dull. The appetite fails. There is great debility. The pulse is quick, weak, and soft, rising often to over 90 beats in the minute. The lining membrane of the nostrils, and that of the eyelids, assume a bilious red appearance. There is a marked rise in the internal temperature, which frequently exceeds 106° F. The under part of the neck, and the space between the branches of the lower jaw, often swell to an enormous extent, so that the head and neck become quite immovable. To inexperienced eyes this swelling may seem to be the cause of death. At other times there is no appearance of swelling. Cases unaccompanied by this swelling of the head and neck may, from the quickened breathing, and from the redness of the mucous membrane, be mistaken for cases of congestion of the lungs. In the latter complaint, however, the animal fights for breath, and is not affected with the depression and semi-unconsciousness of one suffering from anthrax. The breathing, which is entirely abdominal, as may be seen from the heaving of the flanks, becomes more and more quickened, till at last the patient falls from exhaustion, becomes convulsed, and dies, apparently from suffocation. On opening the body, a large quantity of yellowish fluid is generally found about the loose skin which covers the windpipe,

and in the chest and belly; while the lungs and other parts are frequently discoloured by the infiltration of dark, altered blood. The colour of the lungs varies from dull red to black. The mucous membrane which lines the windpipe exhibits an inflamed appearance. The venous blood looks like so much liquid tar; while the arterial blood is thick and dark-coloured. The windpipe and nostrils are often found to be filled with bloody froth.

Nature of the Disease.—The blood of animals which have died of anthrax is found to contain microscopic bodies of a rod-like form, their length being, according to Siedamgrotzky, from 0·004 to 0·018 of a millimetre. A millimetre is about the $\frac{1}{25}$th of an inch. These rods are living organisms. They, or their germs, are alone capable of producing this disease. When they gain entrance into the blood of an animal, they rapidly multiply to an enormous extent by breaking up into segments.

Professor Toussaint has demonstrated that, in anthrax, death is caused by an innumerable number of the "rods" gradually blocking up the capillaries (the minute blood-vessels which form a communication between the arteries and veins), particularly those of the lungs, in which these bodies act as a mechanical obstruction to the passage of the blood. Hence the animal dies from suffocation by reason of the blood being prevented from taking up oxygen from the air, which the patient vainly breathes.

I may mention, in passing, that the office of the lungs is to supply the blood with oxygen from the atmosphere, and to "give off" the carbonic acid con-

tained in the blood. The red corpuscles of this fluid convey the oxygen from the air-cells of the lungs to the various parts of the body. This oxygen, combining with the carbon contained in the impurities of the blood, is converted into carbonic acid, which is expelled from the lungs into the atmosphere at the completion of the circuit of the blood. When the supply of oxygen is curtailed, the blood assumes an unnaturally dark hue.

The quantities of yellow fluid and black infiltration found after death, are owing to the blocking up of the capillaries of the various tissues, which thus become unable to restrain within proper bounds the oozing of the blood through their walls.

The anthrax germ exists as a kind of fungus on certain pastures, and communicates the disease to animals which graze on, or are fed from, these infected lands. It appears to require certain conditions of climate and soil to develop its malignant properties. Thus we find that we have outbreaks of this disease from time to time, rather than isolated cases. Heat, moisture, deficiency of surface drainage, and richness of soil seem to be the chief developing influences.

Referring to Loodiana fever, Mr. F. F. Collins, F.R.C.V.S., remarks, "I have found, by the annual report received from veterinary surgeons, that the nature of the soil at all stations where the disease shows itself is identical, viz., alluvial, with a clayey subsoil. On soils with 'kunkur' (lime), and soils abounding in salts of soda and potash, also good arable loam, the disease never exists. Alluvial soil is common throughout India. I am endeavouring to get the

flooring of all stables made impervious to moisture. The stables at Morar, where the disease used to be very prevalent, I have had floored with rammed kunkur, and no case has occurred there since now two years."

In the *Veterinary Journal* for October, 1879, Mr. Nunn, M.R.C.V.S., records the very exceptional case of Loodiana fever occurring at an elevation of over 7,000 feet above the level of the sea, at the Punjab Hill station of Murree. "The stable was well ventilated, but the floor was of earth, and did not appear to have been renewed for a long time, being infiltrated with drainage, and very foul."

If we turn to the *Veterinary Journal* for December, 1877, we shall find that Professor Bollinger considers that "ground soiled by the blood or excrement of animals affected with anthrax may remain for a long time virulent, as numerous facts prove. . . . Ground so impregnated remains a permanent danger, a kind of predisposing influence, which becomes an active agent in producing the disease when occasional causes arise." Bollinger considers the high temperature of certain summers, and the extraordinary abundance of flies in certain years, to be the principal of these occasional causes.

Hensinger states that all the extremely hot summers of the century (1803, 1807, 1811, 1822, 1826, and 1834) have been anthrax years.

Bollinger thinks that flies play a large part in the distribution of the anthrax germ. He has caused this disease to be produced in animals by inoculation with flies which have been found resting on the bodies of animals that had died from it. He points out that

although many species of flies are susceptible to anthrax, still certain others enjoy an immunity from it.

M. Pasteur states "that a sheep died of anthrax in a field in the Department of Eure-et-Loire, at some distance from any knacker's establishment. The shepherd therefore dug a hole in the ground, and buried this anthracoid sheep. The next year the surface of the ground teemed with millions of germs. In a counter-experiment, M. Pasteur allowed some anthracoid blood to fall on the ground; it became changed into germs, which could be taken out of the earth a year afterwards." (*The Veterinary Journal.*)

Bollinger insists on the complete abandonment for some years of every suspected pasture, as an essential preventive measure, and justly considers that it is better to sacrifice, for one or more years, the grazing of these pastures, than to incur the risk of losing one-third or one-fourth of the number of one's animals. In the meantime advantage may be taken to drain and otherwise improve the land. In every case it is prudent to leave at once a grazing ground where the disease begins to show itself. And, lastly, he thinks that, as a rule, it is better to burn the carcasses of anthrax-stricken animals than to bury them. He particularly recommends the careful disinfection, if possible, of the ground which has been soiled by the blood, dung, &c., of diseased animals. He admits that the measures he recommends are not of easy application, especially in pastures difficult of supervision; but he believes them to be the only rational measures that can be adopted, and that they are in harmony with the present state of our knowledge of the malady.

The anthrax germs gain entrance into the animal's blood probably by means of the grass or hay which he eats. M. Pasteur, when experimenting on animals, to whom he gave forage moistened with a fluid which contained these germs, found that its liability to produce anthrax was greatly increased when the animals' mouths were sore, and when the forage contained rough substances, such as thistles, which were calculated to wound the mucous membrane of the mouth. He also found that the mouth was almost always the part which first became infected. These observations give us strong grounds for thinking that the disease is communicated by inoculation. It is probable that grass, freshly cut from infected lands, is more liable to produce the disease than when it is made into hay.

Professor Feser has proved by experiment that pregnant animals, if affected by anthrax, cannot transmit the disease to the fœtus, as the enveloping membrane, the placenta, in which the blood of the fœtus is brought into connection with that of the mother, seems to act as a filter in preventing the transmission of the rod-like bodies.

Period of Incubation.—Gerlach has shown that the period from inoculation to the time the disease manifests itself varies from two hours to three days.

Duration.—The usual apparent duration of the disease, in fatal cases, is from twelve to forty eight hours.

Identification of the Disease.—If any doubt exists as to the nature of the disease, we may inoculate, with

blood obtained from a horse which has died of it, other animals, such as rabbits, mice, or guinea-pigs: the last-mentioned are very susceptible to the anthrax virus.

If it be desired to keep the blood for future microscopic examination, a little of it may be carefully dried on a piece of glass (as recommended by Mr. Fleming), or sealed up in capillary tubes, such as those made for holding vaccine lymph. Some of the nasal discharge, which is generally full of disease germs, should be similarly treated.

Sanitary Measures.—When an outbreak of anthrax appears among horses, they should be removed, if possible, to some dry, healthy position. The whole of them should be segregated, while there should be a further division made between the sick and the apparently healthy. The water and forage should be changed. If grass was previously used, hay should be substituted for it. Before the horses return to their stables the flooring of the stables should be dug up for a foot or two, the old soil removed, fresh earth should be filled in, and metalling laid down. A solution of a quarter of a pint of carbolic acid in a gallon of water may be poured over the fresh concrete of each stall.

There have been many cases of horses, which were removed from their stables on an outbreak of anthrax occurring, getting the disease on their return after some weeks' absence, when the old soil, which formed the flooring of the stalls, had not been dug up and taken away.

The bodies of animals which have died of anthrax should be burnt, if possible. If this cannot be done,

they should be buried deeply in dry sandy soil, while crude carbolic acid should be used freely over them.

Treatment.—Mr. George Fleming advises the internal and sub-cutaneous employment of carbolic acid. We may give 3 drachms of it in a pint of linseed or olive oil, and we may repeat the dose after four or five hours. We may inject under the skin with the hypodermic syringe, at various points where the swellings appear, a solution of carbolic acid and water—1 to 40.

Carbolic acid acts here by reason of its antiseptic properties, for though the quantities given cannot kill the disease germs, still they may successfully check their development.

Azoturia. (*Nitrogenous Urine.*)

This disease was first noticed by Mr. Haycock, and was called by him Hysteria, as he imagined that it was peculiar to mares, and that it was due to excitement from sexual causes. Professor Williams, however, has pointed out that horses and geldings are also affected by it, and that it is caused by the presence of a large amount of deleterious matter in the blood, which accumulates in it as a result of high feeding and want of exercise, and thus poisons the system. When this disease occurs, it almost always, if not invariably, appears after exercise subsequent on a few days' rest. Muscular exertion seems to be necessary here for the development of the injurious matter whose presence causes such extreme irritation to the nerves.

The presence of a large amount of urea ($C_2H_2N_4O_2$)

in the urine may be shown by adding nitric acid to it, when a precipitate consisting of nitrate of urea will be formed. There is also, generally, but not always, albumen in the urine during an attack of this disease; the albumen will be precipitated by the nitric acid as well as the urea, but the precipitate of the former is dissolvable in weak ammonia, while that of the latter will be unaffected by it.

Symptoms.—The appearance of an animal suffering from this disease is most characteristic. The muscles over the quarters (the gluteal) are violently contracted, which gives the horse a goose-rumped look. One hind limb is advanced in front of the other, and, on attempting to put weight upon it, the hind quarters will drop until the hocks almost touch the ground. The animal is bathed in perspiration, and is in such agony that he will seize anything with his teeth, and not unfrequently will tear the affected side, or his fore-arm. The urine is very dark-coloured, and is usually copious, though the horse is unable to void it. (For the foregoing details of the symptoms of azoturia I am indebted to the kindness of Mr. A. Johnston, M.R.C.V.S.) The high colour of the urine is due to the presence of urea, and of other waste materials.

Treatment.—The proper treatment is removal of the exciting cause; hence give a full dose of aloes. Place the horse in a large, well-ventilated box, and give him plenty of water to drink. If he can stand in slings, put him in them, because, if he is allowed to lie down, he, being very restless in this disease, will knock himself about, and by doing so will greatly increase the fever

and excitement; in some cases, however, he will be quite unable to support himself at all with his hind legs, and consequently would fall back in the slings, if they were employed. If the pain be very extreme (but not otherwise), give a couple of ounces of tincture of opium; and, if the pulse be very high and full, take away three or four quarts of blood. Apply, as recommended by Mr. C. Elam, of Liverpool, a large hot bran poultice to the loins, or foment the loins and quarters with warm water. Clothe the animal so as to encourage the skin to act.

The urine should be drawn off by means of a catheter from time to time.

On the next and following days, give ounce doses of sweet spirits of nitre, mixed in cold water, three times a day. If there be constipation, give a pint of linseed oil.

In this disease, symptoms should not be treated by giving astringents to change the dark colour of the urine. Mustard plasters should on no account be put on the loins or quarters, for the irritation caused by them would greatly augment the fever. The food, at first, should be light and laxative. As there is great subsequent debility, the strength should, after the acute symptoms have passed off, be kept up by liberal feeding. A drachm of sulphate of iron may be mixed through the food daily. The horse may get a couple of quarts of beer a day.

After a severe attack the animal rarely recovers the full use of the affected limb, while deaths, in such cases, are more frequent than cures.

Rheumatism

Is a form of inflammation which gives rise to pain, heat, and lameness, without the formation, except in very rare cases, of abscesses.

It attacks tendons, ligaments, joints, and the sheaths of muscles.

Nature of the Disease.—The body of the horse, in its various parts, suffers constant waste, which is again made up from the food that is absorbed into the blood. During this process of waste and repair there are certain products formed, which, if retained in the system, would poison it. In health these deleterious matters are thrown off by the excretory organs, the kidneys, bowels, liver, lungs, skin, &c., with sufficient quickness to obviate any injurious effect their undue retention might cause. Thus we have the formation of urea, which poisons the system when the kidneys are unable to efficiently eliminate it, as occurs in Bright's disease. When the body is subjected to conditions opposed to health, or suffers from some innate disturbance, not alone may these hurtful matters of which we have spoken be retained in excess in the blood, but other injurious materials may be produced which will give rise to disease. It seems probable that the cause of rheumatism is an excess, in the blood, of lactic acid, or of some acid material which becomes deposited in various parts, and gives rise to inflammation from the irritation its presence sets up. The circulation of blood being more languid in fibrous structures, such as tendons and ligaments, than in more vascular tissues,

this deposition appears to take place with special readiness in them; hence the occurrence of the disease in tendons and ligaments, and also in joints, which are held together, generally speaking, by these fibrous structures.

As the exciting cause of rheumatism is distributed throughout the entire system, the inflammation has a marked tendency to shift from one part to another, in what might appear to be a capricious manner.

What is called *muscular rheumatism* is a mild form, which seems to have a strictly local origin. The *cellular tissue* which serves as a sheath to the muscular fibres is the probable seat of the disease.

The local application of cold frequently gives rise to muscular rheumatism. This is probably owing to the fact that cold checks the circulation of blood in the part chilled, and hence favours the deposition of the acid which is the supposed cause of the disease.

In some localities rheumatism is much more prevalent than in others. The drier the climate, the greater the immunity appears to be.

Varieties.—There are three forms of this disease, viz., acute, chronic, and muscular. I include the last-mentioned simply for the sake of convenience, for it is difficult to distinguish practically between it and true rheumatism.

Symptoms.—In acute rheumatism there is high fever, with a hard, quick pulse. Internal temperature of the body is high. The bowels are costive, while the amount of urine passed off is less than in health. The urine has an acid or neutral reaction, instead of an alkaline

one: that is to say, if red litmus paper be dipped into it, it will fail to turn the red colour blue; while if blue litmus paper be thus treated, it will, in the event of there being an acid reaction, be turned red; or if the reaction be neutral, the colour will remain unaffected. There is pain, and, almost always, heat and swelling in the part where the disease is locally manifested, with consequent lameness. The great characteristic of acute rheumatism is the manner in which it flies from one part to another. When the inflammation takes place in the tendons, it may be easily mistaken for that of sprain; the history of the case must here guide us in determining the nature of the disease.

In *chronic rheumatism*, marked fever is seldom present, while the inflammation is less intense though more lasting, and is much less liable to change its point of attack than the acute form. It is a most serious disease, as it leads to structural alterations in the affected parts.

Muscular rheumatism seems to be a local affection due to cold or damp. It affects the muscles, and resembles the chronic form in its symptoms, except that it is of not such a persistent character. In the horse it appears to be principally confined to the muscles of the shoulders and those of the loins. It is probable that many so-called cases of *kumree*, in India, are simply muscular rheumatism of the loins.

The muscles of the parts suffering from rheumatism naturally waste away.

Principles of Treatment.—Accepting the cause of true rheumatism to be the presence in the blood of some acid material which becomes deposited in various parts,

we find that the most successful plan of treatment is to endeavour (1) to neutralize the acid contained in the blood, by giving alkalies, such as salts of soda or potash; (2) to remove from the system the morbid material, by exciting to action the various excretory organs; and (3) when inflammation appears in any part, to get rid of the cause of irritation by stimulating the *absorbents* by the application to the skin of blisters, or other so-called counter-irritants.

Local treatment will be sufficient for muscular rheumatism.

Practical Treatment.—Give a moderate dose of physic, to be followed by 2 oz. bicarbonate of soda in the food daily; give 1½ drachms iodide of potassium in a pint of water twice a day as a drench, until the symptoms disappear, or until this medicine affects the animal's health. Wherever rheumatic swellings appear, apply a cantharides blister, of course taking care that the surface blistered at one time be not too extensive. Keep the animal warmly clothed and stabled. Give him plenty of water to drink, and restrict him to green and laxative food.

When the inflammation is in a convenient position, such as the shoulder, the subcutaneous injection of a solution of a couple of grains of acetate of morphia daily, for a few days, may prove very beneficial.

The effect of galvanism might be tried with advantage.

Glanders and Farcy

Are different forms of the same fatal and contagious disease.

" The discharge from the nose of a glandered horse, when introduced into the systems of other horses, may in one produce glanders, and in another farcy, whilst the pus [matter] from a farcy ulcer may produce in the inoculated animal glanders, farcy, or both ; and the common termination of farcy, if a horse affected by it be allowed to live a sufficient length of time, is glanders, and of glanders, farcy. Such an animal is described as being both glandered and farcied." (*Williams.*)

This disease may be propagated by infection or by inoculation. It seems to be spontaneously developed in the healthy animal by defective sanitary arrangements. Cases have occurred on board ship, in which glanders has appeared among a number of horses after they were battened down for a few hours during rough weather, and were thereby kept in a poisonous atmosphere for that time.

There seems to be a strong resemblance between consumption as it appears among human beings, and glanders, which always first appears in the form of tubercles in the lungs and other internal organs, the other symptoms, such as running at the nose, &c., being but subsequent manifestations of the disease in its fully developed stage.

It is not improbable that glanders is caused by the entrance into the blood, from without, of disease germs, which we have shown to be the cause of charbon or Loodiana fever. If this surmise be correct, bad sani-

tary conditions, which seem to give rise to apparently spontaneous cases of glanders, act only in predisposing the animal to the attack.

These apparently spontaneous cases of glanders break out only among horses, donkeys, and mules, never among other animals.

Glanders appears to be unknown in Australia and New Zealand.

Owing to defective stable management, this disease was formerly very common in England, but fortunately it is now rare.

Neglected cases of influenza sometimes terminate in glanders. They may also be mistaken for it by inexperienced persons.

Glanders not unfrequently sets in after a long-continued state of ill-health, or after diseases which are followed by much debility.

Inoculation.—The virus of glanders is readily communicated, by inoculation with the discharge from the nostrils, to man and other animals from the horse, and *vice versa.*

The mere contact of glanders matter with any of the mucous membranes is sufficient to give rise to the disease. Hence it is advisable, when examining a suspected horse's nostrils, to be very careful to avoid the possibility of him sneezing or coughing in one's face.

According to Schimming, glanders-tainted blood, if injected into the veins of a healthy horse, will produce glanders, but it is not so active an agent as the discharge from the nostrils of a diseased animal.

Infection.—It is notorious that ill-ventilated and

badly-kept stables, in which horses suffering from glanders have resided, will retain the virus of this disease for a long time after the removal of the glandered animals. Even the most careful process of disinfection appears at times to be powerless to eradicate it. Many sad cases of persons, who lived in lofts above stables in which glandered horses were stabled, contracting this disease have occurred, without any evidence to show that they came in contact with these animals, or with the discharge from their nostrils. Mr. George Fleming states that when healthy horses are kept along with those affected by glanders, from 25 to 50 per cent. catch the disease.

Horses which have open wounds, such as those which have been recently castrated, appear to be much more susceptible to the contagion than are animals whose skins are intact.

Period of Incubation.—"In acute glanders the period of incubation is very short—from three to seven days; whilst in the chronic form the period is very uncertain, extending from a few days to several months." (*Williams.*) For chronic glanders, a month or six weeks is probably the usual time. The stronger and more healthy the horse is, the longer will he resist the inroads of this disease.

Varieties.—Both glanders and farcy are respectively divided into the acute and chronic forms, according as their development is rapid or slow. Chronic farcy is held to be curable in mild cases, but I would strongly advise the owner to get rid of the affected animal at once, for though he may apparently recover for the time being, he will almost certainly have a relapse,

while the disease will gain strength with each succeeding attack.

Symptoms of Glanders.—Glanders is characterized by a continuous discharge, which generally issues from one nostril only, or more rarely from both; it has the appearance of the white of egg, or of boiled starch; it is sticky, and dries round the edge of the nostrils, while that of nasal gleet has a yellowish-white, creamy look. The lining membrane of the nostrils, instead of being of a healthy red colour, is at first pale or leaden-coloured, and subsequently assumes a purple or coppery hue. In the acute form this membrane becomes ulcerated.

"The ulcers are characteristic, being excavated, as if cut with a punch, but after a time they become ragged at their edges, irregular, enlarged in all directions, and confluent. The spaces between the ulcers are covered with pimples, which soon ulcerate." (*Williams.*) These chancrous-looking sores are often absent in the chronic form. The discharge is accompanied by swelling of the gland or glands in the hollow between the jaws of the affected side or sides. This characteristic swelling "is known by its isolated character, by its distinctly being the only tumour present, the skin being drawn tensely over it, and the surrounding space being perfectly clear from any tumefaction; lastly, by its close and immovable adherence to the side of the jaw against which it lies. Should there be disease in both chambers of the nose, we shall have tumefied glands on both sides, though it will rarely happen that both sets of glands will swell at one and the same time." (*Percivall.*) These

tumours are the result of sympathy with the irritation in the nasal passages.

The fact of there being a flow of tears from the eye which is on the same side as the diseased nostril, is a symptom of glanders.

As observed by Professor Williams, *acute glanders* is preceded by more or less persistent shivering fits, and a marked rise (often of 7° or 8° F.) in the internal temperature of the body. Fever and constitutional disturbance now set in. The glands between the lower jaws swell, and feel hard and adherent to the bone. The characteristic discharge issues from the nostrils; ulcers break out inside them, while the animal quickly succumbs from the severity of the attack. Acute glanders usually runs its course in a week or ten days.

The approach of *chronic glanders* is extremely insidious, there being often nothing to mark its presence except a sticky discharge from the nostrils, and the fact of the glands between the lower jaw being hard and swollen, while no ulcers may be visible inside the nostrils. A horse may continue in this state for many months. After a time the animal's general health breaks up, or acute glanders sets in, and he dies.

A horse is said to have *sub-acute glanders* when the disease takes a more or less chronic form, with marked ulceration in the nasal cavities.

As pointed out by Percivall in distinguishing glanders from catarrh, the absence of cough, or soreness of the throat, will strengthen our suspicion of the existence of the former disease.

In influenza there is often running at the nose, and swelling of the glands of the jaw.

In glanders, the lungs and other internal organs become seriously diseased.

Symptoms of Farcy.—Small hard tumours break out on the surface of the body, usually on the insides of the thighs and forearms, or on the neck. In the acute form there is fever and swelling of the affected limbs. "The swellings, which are called buds, due to inflammation of the glands and valves, point and burst, giving rise to a purulent material. These buds are generally found in groups, and away from the articulation." (*Williams.*) In the chronic form the swellings may continue indolent for a long time, while their appearance may have been preceded by little or no constitutional disturbance.

Development.—As treatment is practically of no avail, our efforts, in cases of doubt, should be directed to the speedy development of the disease, if it be present, on account of the danger there is to man and beast in keeping an affected animal.

To accomplish this object, give daily fifteen grains of the bichromate of potash for two or three days. This will cause the disease, if existing in the system, to assume a virulent and well-marked appearance. A dose of physic will also develop it, but I cannot advise anyone to run the risk of introducing his hand into the mouth of a glandered horse.

This employment of the bichromate of potash was first proposed by Mr. A. Johnston, M.R.C.V.S.

In doubtful cases it is advisable to inoculate some worthless animals with the discharge from the nostrils of the suspected horse. As glanders in donkeys is of a well-marked and virulent type, these animals are fit

subjects for such experiments, which should not be made except when the stake at issue is of sufficient importance to justify the cruelty.

Melanosis

Is a malignant growth which occurs in various parts of the body, and is due to the deposition of colouring matter. It appears outwardly in the form of tumours, which gradually increase in size, and are usually situated on the lower, and sometimes on the upper surface of the tail, and about the anus, sheath, and crest. When it affects the tail, or crest, the hairs of these parts gradually drop out. Melanosis is almost entirely confined to gray horses, appearing usually after the ninth or tenth year, when the coat begins to turn white. It is much more common in India than it is in England, perhaps because the proportion of gray horses to those of a darker hue is much larger in the former than in the latter country. The greater effect light has, in India than in England, on the colouring granules of the pigment cells, may have something to say to the increased number of cases met with in the hotter climate. When existing to any extent, melanosis is a disgusting disease. It is not alone an eyesore, but also, from interfering with the internal organs, may permanently injure the horse's health, or even prove fatal to him. The animal's condition is more or less affected by the irritation caused by these tumours. The abscesses will often, especially if they be subjected to friction, burst, and form unhealthy sores, which discharge a dark-coloured fluid.

The treatment can be only palliative. The malignant growths may be excised or burnt out. They will, however, assuredly re-appear.

I may observe in passing, that a non-malignant tumour is always confined to the same tissue in which it first occurs, as in the skin, for instance; while the malignant form may, either simultaneously or consecutively, affect different tissues.

Weed, Swelled Leg or Lymphangitis

Is inflammation of the glands of the leg.

Symptoms.—The inflammation is usually confined to one hind leg. The attack is preceded by a shivering fit or cold stage, hence its common designation "shake." This stage, as in ague, is followed by a hot period, with high fever, quick, full pulse, and great pain of the part. The glands at the groin, or at the elbow, as may occur in some few instances, swell. This swelling extends downwards to the foot, while in farcy the swelling extends upwards. The hot stage is terminated by sweats breaking out over the body. When the swelling subsides, the inflamed lymphatic vessels of the leg appear clearly defined like enlarged veins, hence the term "weed," from their supposed resemblance to a vegetable growth. As it generally occurs on working the horse after a day or two's idleness, the term "Monday morning disease" is also applied to it.

Cause.—Over-feeding and neglect of regular exercise.

Termination of the Disease.—After repeated attacks

the leg is very liable to become permanently enlarged—an incurable condition termed *elephantiasis.*

Nature of the Disease.—While the arteries are occupied in conveying materials for the repair and development of the various parts of the system, the lymphatic vessels and smaller veins remove the waste and broken-up matters. The lymphatics, which at first are of very minute size, gradually enlarge, and form over the surface of the body a network of vessels which somewhat resembles that of the veins. In health, these vessels are not outwardly apparent to the eye, but when irritated they become swollen and painful. When the horse is over-fed and under-worked, the lymphatics become surcharged with unused nutritive matter, and may become inflamed and swollen from the irritation produced by its presence. Exercise directly adds to the quantity of waste material which is already in excess in the lymphatics, hence its tendency to produce "weed" in horses which are predisposed to it by having had too much corn and too little work. Owing to the existing inflammation, a large quantity of fluid escapes from the vessels into the adjoining tissues, and gives rise to the swelling. This fluid has a tendency to become consolidated unless it is promptly removed by the lymphatics and smaller veins, whose power of doing so is checked as long as they remain inflamed; hence the advisability of reducing the inflammation as quickly as possible, and of endeavouring to prevent its recurrence.

Treatment.—At the first appearance of the inflammatory stage give a dose of physic. Bathing the part

with warm water and applying warm fomentations are indicated by the fact that as the swelling increases, the pain and lameness diminish. Give ten drops of Fleming's tincture of aconite, in a pint of cold water, as a drench, once or twice, as may be deemed advisable from the state of the pulse. During the intervals in which the leg is not fomented, keep it smeared over with the extract of belladonna, made up with a little gum to render it adhesive. While the cold stage lasts, keep the animal warmly clothed. Put him on laxative food, and give, after the first day or two, an ounce of sweet spirits of nitre in his food daily for a week. The affected leg should be neither blistered nor fired. The best means for reducing its size is hand-rubbing, and the pressure afforded by an elastic or flannel bandage. The horse should on no account be worked until all inflammatory symptoms have subsided. After an attack, great care should be observed as to his feeding and exercise, for the disease has a marked tendency to recur, and by doing so to cause a permanent thickening of the limb.

If abscesses form, they should be freely opened with the knife.

CHAPTER XVI.

Diseases of the Liver.

ACUTE DISEASE OF THE LIVER—CHRONIC DISEASE OF THE LIVER.

Acute Disease of the Liver.

As it is most difficult to distinguish the various diseases of the liver of the horse, one from another, in the living animal, and as they are rare in Europe, and have consequently been but little studied, I cannot see, with our present state of knowledge, the use of following human physicians in their minute divisions of these affections. Congestion is the first stage of inflammation of the liver, while jaundice is but a symptom of derangement of that gland. Hence for all practical purposes it will be sufficient to divide these diseases under two broad headings, viz., acute and chronic.

The grave functional diseases of the liver to which men are liable, are practically unknown among horses.

Causes.—The usual causes are too high feeding ; want of exercise ; defective ventilation ; and exposure to heat, especially when succeeded by cold. In India these affections are very common, as many horses become predisposed to derangement of that organ during the hot weather, while acute attacks are very frequent just after the rainy season, in localities where there is

considerable fall in the temperature of the air at night, as in places close to the hills; for the native grooms, who are generally but ill provided with garments, often remove the horse's clothing to use as their own bedding. It is easy then to conceive how the horse gets derangement of the liver; for the cold, acting on the surface of the body, contracts the superficial blood-vessels, and determines the blood on to the internal organs. Besides this, the continued application of cold has a depressing effect on the nervous system, and thus influences the circulation. It stands to reason that the organ which is in the worst state of health will be the first to suffer from a sudden rush of blood. Hence we find that in cases of chill, the liver of the horse is particularly liable to disease in the hot climate of India; while the lungs, pleuræ, or bronchial tubes are more prone to attack in the cold climate of Great Britain.

I have found that acute attacks of liver disease, in India, are comparatively frequent in places where there is a marked fall, at certain seasons of the year, in the temperature of the air at night; and that chronic disease of that organ is more rife in sultry climates like that of Bengal.

Australian and English imported horses, in India, are much more liable to suffer than are Arabs and indigenous animals.

The practice, in India, of bathing in cold, instead of in hot water, is a fruitful source of liver disease among men. It acts in the same baneful manner as that of depriving horses of their clothing during cold nights which follow hot days.

Symptoms.—Yellowness of the gums and of the lining membrane of the eyelids; loss of condition; clay colour and offensive smell of the dung, which is sometimes mixed with coffee-coloured patches. Sour smell from the mouth, loss of appetite, constipation, urine high-coloured on account of the colouring matter of the bile being excreted along with it. There is dulness and depression, accompanied at first by some fever, which may be perceived from the increased quickness of the pulse and rise in the internal temperature of the body. The horse may evince, on pressure over the region of his liver (the right side), the presence of pain. In some few cases there is lameness of the off fore-leg.

Nature of the Disease.—The liver is a gland whose office is to convert various substances—which accumulate in the blood, and whose undue retention would poison the system—into other products which can be readily removed from the blood by the kidneys, and then passed off along with the urine; and to secrete bile. It is largely concerned in the maintenance of the internal temperature of the body. It appears that the *white corpuscles* of the blood are formed in the liver, and the *red corpuscles* are destroyed there. The *fibrin* of the blood becomes broken up in its passage through the liver. The marked increase of fibrin (the material which forms the solid *clot*) which is observed to take place in the blood during inflammatory diseases may be due to the function of the liver becoming impaired. We may therefore sum up, in general terms, the offices of the liver to be as follows:—1. To purify the blood, and to assist in its manufacture. 2. To maintain the internal temperature of the body. 3. To form bile.

The liver is composed of a great number of small *lobules*, while the bile cells make up their mass. Each lobule is complete in itself, having blood-vessels both for its functional purposes and for its own nutrition, as well as bile-tubes for conveying away the bile.

Certain nutritive portions of the food are absorbed from the intestines by minute blood-vessels which, when united, form the portal vein. This vein and the hepatic artery convey blood to the liver. After dividing into a number of small vessels which surround the lobules, they supply them with blood by giving off very minute blood-vessels (capillaries) which radiate inwards to the centre of each lobule from whence the blood is removed by branches of the hepatic veins. The *bile cells* of each lobule are situated between these capillaries. The hepatic artery supplies the walls of the various vessels and ducts with blood and ramifies through every part of the liver. The lobules are about the size of millet-seeds.

The bile tubes are lined with a mucous membrane, which, in a state of health, constantly secretes mucus to lubricate these passages. Surrounding this membrane there is a coat of involuntary muscular fibre, which urges, by its contraction, the bile and mucus forwards. These tubes lead into larger ones, and finally, the bile is discharged through one common duct—which also conveys away the pancreatic juice into the small intestine close to the stomach, and mingles with the semi-prepared food (the *chyme*) which has just quitted that organ. *Bile* seems to act as a natural purgative, and also as an antiseptic in checking decomposition of the food. Hence, when it is absent, the bowels become

constipated, and the dung emits an offensive odour, and assumes a clay colour from absence of the colouring matter of the bile. When the bile is irregularly discharged, there are often coffee coloured patches found in the dung, which is owing to an altered condition of the bile. This secretion assists the pancreatic juice in forming an emulsion with the fat contained in the chyme. These fluids being alkaline, a soap is formed, in which the oily particles are split up into a very fine state of division. This minute separation of the fat gives the chyme (now called *chyle*) its white appearance, in the same manner as it does in the case of milk, the object of the minute division of fat being to facilitate its absorption. Hence when the amount of bile, which is discharged into the intestine, is deficient in quantity, it is probable that the animal will get thin.

Bile is composed of colouring matter and of bile acids. The latter are manufactured in the liver. It is probable that the yellow bile pigment is derived from the colouring matter of the red corpuscles of the blood, which are broken up in the liver during the passage of the blood through that organ.

Congestion of the liver is rare in England, but is not uncommon in hot countries. It is induced, as I have said before, by want of exercise, high feeding, and heat. The vessels of the liver become over-filled with blood, and, as at the outset of every case of inflammation the function of the attacked organ is stimulated, an increased supply of bile is secreted. The liver now swells considerably. The bile tubes become blocked up, owing to the inflamed state of their mucous linings, and to

the presence of the over-distended blood-vessels, and the whole gland becomes gorged with bile, while little or none, as shown by the clay colour of the dung, is discharged. The bile, thus obstructed, is in part absorbed by the blood, and taken into the general circulation, so that the various tissues acquire the characteristic tinge of jaundice from the colouring matter of the bile. The bile is finally excreted by the kidneys, and, to a small extent, by the skin.

Jaundice, we have seen, occurs when the liver becomes overloaded with bile. It may also take place when the action of the liver is partially arrested. In the latter case it appears that the colouring matter of the broken-up red corpuscles of the blood, failing to become combined with the bile acids to form bile, are retained in the blood, and consequently tinge the various tissues.

The depression and debility experienced in jaundice have been generally attributed to the presence of bile in the blood. It is, however, most probable that they are due to the retention in the blood of various impurities, which the liver, when it is in a diseased state, is unable to transform with sufficient quickness into products that the kidneys can readily remove; for we find that the injection of bile into the blood gives rise to no special symptoms of depression, while the fact of the various tissues being stained with the colouring matter of bile does not in all cases imply the existence of weakness and debility.

From the foregoing remarks we may learn that, in congestion or inflammation of the liver, we have the following conditions:—1. The arteries and veins of the

gland are distended with blood. 2. The function of the liver being more or less arrested, the blood becomes loaded with impurities, while the general health suffers to a marked degree. 3. The liver is gorged with bile, which is unable to escape on account of the blocking up of the ducts. 4. The blood is loaded with bile. 5. Owing to the absence of this secretion in the intestines, they become constipated, and the food becomes quickly decomposed, while the system absorbs deleterious gases from the dung before it can be finally expelled.

Let us glance at *the causes* of liver disease.

When an animal is *fed too highly* his blood becomes overloaded with waste material, which his liver is unable to convert into products that can be readily thrown off; the consequence being that this gland becomes deranged from overwork, and the system poisoned by the undue retention of these hurtful matters. An excess of fat or sugar in the food is very liable to overtax the powers of the liver.

As the liver requires a large amount of oxygen for the purification of the blood, *the want of air and exercise* is specially injurious to the organ under consideration. Exercise quickens the circulation of blood through the liver. "Since the time of Haller, physiologists have recognised the influence of the respiratory movements in promoting the circulation of blood through the liver; but, upwards of thirty years ago, Mr. Alexander Shaw, in a paper which has attracted too little notice, showed more clearly than ever before that the circulation of blood through the liver was greatly influenced by the alternate expansion and contraction of the

thorax during respiration." (*Murchison.*) "Want of exercise and heat diminish the respiratory functions, and causes that of the liver to be disordered, and the result is enlargement of the organ from accumulation of fat." (*Bennett.*)

The "results of a *heated atmosphere* are, no doubt due in part to the rarefaction of the air and a corresponding diminution in the supply of oxygen to the system; the hotter the air, the less will be the amount of oxygen in a given volume inhaled by the lungs. But that is, perhaps, not the sole, if the chief, explanation. Experiment has shown that one of the effects of a high temperature upon the lower animals is to produce a degeneration of the parenchyma of the liver, its secreting cells becoming filled with minute granules, and presenting appearances similar to those found after death from febrile diseases." (*Murchison.*) Continued heat, like continued cold, undoubtedly acts as a strong nervous sedative, and hence renders the circulation torpid.

Principles of Treatment.—To relieve the congestion of the vessels of the gland, we may employ means to draw the blood to other organs, and to diminish its volume. A purgative will accomplish both these objects, for by irritating the intestines it will cause a quantity of blood to be determined to them, producing, in fact, temporary congestion of their vessels, while it will also bring about the evacuation of a quantity of the watery constituents of the blood. A moderate bleeding, say a gallon, might be tried; though I cannot advise its employment, because these affections are accompanied with considerable depression and debility.

A purgative is, I think, much preferable in such cases, for its effect is less weakening to the system. Besides this, it purifies the blood of deleterious matters which are held in solution in the watery part of the blood, by causing the discharge of a quantity of that watery fluid. The purgative will also relieve the fourth condition I have mentioned, viz., constipation, thus preventing the absorption of deleterious gases from the dung prior to its evacuation. The aperient I would recommend is the sulphate of magnesia (Epsom salts). Its action should be assisted by keeping the horse on laxative food, such as bran mashes, roots, and green fodder. Two or three enemas of water (100° F.) to clear out the rectum might be administered. As the kidneys and skin (to a lesser degree) are the organs which remove the bile that is absorbed into the blood, we may with advantage stimulate them. For this object I would advise the use of nitre—which acts on the kidneys—or of sweet spirits of nitre—which acts on the kidneys and skin, and is also a stimulant—warm fomentations over the region of the liver (the right side), and warm clothing.

To aid in overcoming the great debility, as well as to stimulate the kidneys and skin, the employment of sweet spirits of nitre is, I think, specially indicated.

Care should be taken to allow the animal a plentiful supply of fresh water, in order to keep the blood in a sufficiently fluid condition.

Moderate exercise and a full supply of fresh air are most essential.

While we have thus endeavoured to reduce the congestion of the liver, to remove the bile which has been

absorbed into the blood, and to overcome the constipation of the bowels, we have in ipecacuanha a valuable agent for relieving the obstruction to the flow of bile into the intestines, for restoring the gland to its healthy function, for mitigating the congestion, and for allaying the fever by its sedative properties.

During the autumn of 1875, in India, I was advised to try ipecacuanha by Mr. Kettlewell, V.S. Bengal Studs, in the case of a racehorse I had, which was suffering from an acute attack of congestion of the liver. The animal presented the usual symptoms of great depression, yellowness of the mucous membranes, and clay colour of the dung. When the ipecacuanha had been given for two or three days, these conditions rapidly disappeared, and a speedy restoration to health was the result. During the racing season of 1875-6, in India, following Mr. Kettlewell's advice, I suggested the use of this drug in several cases of congestion of the liver, and always with marked success; its good effects, after a few doses, being clearly shown by the improved colour of the mucous membranes and dung. Ipecacuanha appears to act by stimulating involuntary muscular fibre, and thus relieves congestion of the blood-vessels of the liver by causing their muscular coats to contract, while, in the same manner, the obstruction in the bile-ducts is relieved, and the secretion is allowed to flow into the intestine. The action of this drug here is very similar to that which it has in relieving the distressing symptoms of bronchitis in the human subject; for when the mucous membrane of the bronchial tubes is dry and inflamed, it alleviates the congestion of the blood-vessels and causes a healthy

secretion of mucus; while if the bronchial tubes are blocked up by mucus (phlegm), it stimulates their muscular coats to expel it. In human practice it is in such cases called an *expectorant*, but, as regards the horse, we may more correctly term it a *deobstruent*. That a horse does not spit up phlegm in the same marked manner as a man does, is no proof that expectorants do not act on him, for the phlegm probably gets dislodged all the same, but instead of being spat out, it may fall into the gullet, and thence pass into the stomach, or drop slowly from the nostrils or mouth.

Sir Robert Christison was, I believe, the first to remark on the action which ipecacuanha has on the liver.

Alkalies, such as the *bicarbonate of soda*, are most useful; for, according to Dr. Bence Jones, they greatly assist in the oxidation of the products of unused nutritive matter and of broken-up tissue in the blood, which the liver is called upon to convert into substances the kidneys can speedily get rid of.

Chloride of ammonium, or *sal-ammoniac* (see Dr. Murchison's *Functional Derangements of the Liver*), exercises a powerful influence in relieving the portal circulation of the liver. As the amount of nitrogenous solids in the urine increases largely after its use, we may surmise that it tends to restore to the liver its healthy function of purifying the blood by aiding in formation of these products. It may be used in combination with alkalies or mineral acids.

Sal-ammoniac is a good stimulant. Its value in chronic disease of the liver is probably due, to some

extent, to its power of causing the absorption of effusions. This property is well shown if we apply a little of it, dissolved in water, to a black eye, for it will quickly aid in the removal of the extravasated blood.

As a rule, *salts of iron* should not be given. If a tonic be required, try nux vomica, gentian, or chiretta.

Practical Treatment.—Agreeably to the foregoing remarks we may give, on one or more occasions, as a drench—

Sulphate of magnesia (Epsom salts) -	8 oz.
Water - - - - - -	3 pints.
Treacle - - - - - -	sufficient.

Give $1\frac{1}{2}$ drachms of ipecacuanha in a ball twice a day for a week. It may be discontinued sooner if the gums and insides of the eyelids recover their natural healthy hue before that time. Administer, as a drench, an ounce of sweet spirits of nitre in a pint of cold water, two or three times a day. The Epsom salts and sweet spirits of nitre may be given as the symptoms seem to indicate. An enema of warm water (100° F.) may be administered from time to time if the constipation continues.

Apply warm fomentations over the liver (on the right side), keep the horse warmly clothed and stabled. Allow him bran mashes, roots, green fodder, and plenty of water to drink. A little gentle exercise—say a walk for a mile or two, once or twice a day—may be given at discretion.

Two ounces of bicarbonate of soda mixed in the daily allowance of food, and half an ounce of sal-ammoniac in a pint of water, as a drench, three times a day, may be tried with advantage.

Chronic Disease of the Liver

May be induced by poor and insufficient food, the liver then sharing in the general wasting of the tissues; or, as we usually find, particularly in India, by too high feeding and want of exercise, in which case the animal will usually have suffered from acute attacks on previous occasions.

Nature of the Disease.—During congestion of the liver, the blood, from the over-distended state of the vessels, is unable to circulate with its wonted facility through that organ, which is consequently unable to perform its duties in a proper manner. The bile cells are also subjected to considerable pressure, which, if long continued, will cause them to become stunted, or even obliterated. Repeated attacks may cause the consolidation in the liver of a portion of the watery part of the blood which has escaped into the substance of that organ, owing to the over-distended condition of the blood-vessels during congestion or inflammation; while too high feeding, particularly in hot climates, may lead to fatty or other degeneration. All these changes will most materially impair the working efficiency of the liver. The proper treatment will naturally consist in feeding the horse on food which will have the least possible tendency to overtax his liver, while we may depend on bicarbonate of soda and sal-ammoniac as the safest and most efficient medicines.—Respecting their actions see page 366.

Symptoms and Treatment.—These diseases are rather obscure in their nature. The cases which I have seen

in India presented but few characteristic symptoms to guide the observer. There was always depression of spirits, loss of appetite for corn, although the animal would eat plentifully of green meat of every sort, and wasting of the muscles, which was very apparent over the hind quarters; while the animal often became pot-bellied. There was generally some constipation, the dung lighter coloured than natural, and the gums and lining membrane of the eyelids were pale, and tinged with yellow. The coat did not seem to be particularly affected. I have found that in these cases the animal got considerably better on a course of green fodder, roots, and regular though moderate exercise, with now and then a short course of bicarbonate of soda, or sal-ammoniac; but that if he was restricted to "hard" food, he would rapidly lose the little condition he had "put on," while the mucous membranes would become yellow, and the mouth would acquire a sour smell. I have rarely seen a radical cure effected in the case of a horse suffering from chronic disease of the liver in India.

The appropriate treatment would be green food, attention to ventilation, and a free supply of fresh air and moderate exercise. Two ounces of bicarbonate of soda may be given in the food daily, and half an ounce of sal-ammoniac in a pint of water three times a day. These medicines may be continued for a month, or longer.

A biniodide of mercury blister might be applied over the region of the liver, with the object of causing absorption.

CHAPTER XVII.

NERVOUS DISEASES.

PARALYSIS OF THE LOINS, OR KUMREE—TETANUS, OR LOCKJAW—STRING-HALT.

Paralysis of the Loins, or Kumree,

Is not an uncommon disease in many parts of India. The word *kumree* is derived from the Persian *kumr* (the loins), and signifies something affecting that part.

Localities in which this Disease is Prevalent.—It occurs in Bengal, Behar, the Malabar coast, and in other parts of the Indian Empire which have a damp, hot climate, especially if such places are subject to east winds, or to land winds if on the sea-coast. It is very common in Burmah, is met with in the Mauritius, and appears, I am informed, on the West Coast of Africa.

The development of kumree seems to be particularly favoured by a moist, relaxing climate, which is very different from the dry, warm condition of the air that is peculiarly suitable to the general health of the horse.

Breeds of Horses which are most Subject to Kumree.—Arab and Australian horses are peculiarly liable to this disease. As they are the only horses which are imported in any numbers to the countries in question we may reasonably conclude that any other foreign horses

which were bred in a moderately dry, bracing climate would be equally susceptible. Indigenous ponies, and, to a lesser extent, indigenous horses, enjoy a strange immunity. My experience is that Arab stallions are much more liable to get kumree than are any other kinds of horses. With very few exceptions, the Arabs which are imported to India and other countries are entire, while geldings predominate to an equal extent among the Australian importations. The proneness of Arab entire horses to this disease is usually attributed to the fact that a large proportion of them contract the habit of masturbation, and thereby weaken themselves. I have observed that Arab racehorses, which are properly looked after and steadily worked, rarely contract kumree.

Symptoms.—The manner in which the disease comes on varies extremely in different cases. In some, there is at first nothing to indicate the mischief beyond a trifling awkwardness in the animal's hind action, which, on being observed by persons well acquainted with the symptoms of kumree, might elicit the remark that the horse was beginning "to go in the loins," though he might be still able to perform his accustomed work in a fairly efficient manner. We should then probably find that he would get gradually worse, till after a few months he would be unable to support the weight of an ordinary rider, would almost sit down if made to back quickly, and could turn with but difficulty. Unless the case is a very bad one, the animal will walk and trot fairly well when he has no weight to carry. In serious cases, he "drags" his hind legs, and can progress but slowly. When the disease comes on in a

gradual manner, there does not appear to be any special constitutional disturbance beyond the paralysis.

In some instances the symptoms are suddenly developed, while the animal may sink from the effects of their severity in a few days.

The disease, if allowed to run on, generally assumes a chronic form. The horse may recover sufficiently for light harness work, or may continue quite useless. In the latter case he usually gets gradually worse, and dies after some time.

I have never heard of a recovery after a severe case of kumree. Mild cases do sometimes, though very rarely, get all right again.

Hereditary Predisposition.—I learn from the Bengal Stud Records that kumree is not transmitted by parents to their offspring; a stallion, therefore, if paralyzed to but a slight extent, may be used to breed from. A mare similarly affected will rarely be able to bear the weight of the horse.

Post-mortem Appearances.—There is nearly always a certain amount of congestion observed about the spinal cord and its coverings. There is usually an unnaturally large quantity of watery fluid found in the spinal canal.

Nature of the Disease.—The all but universal idea in India is that this paralysis is caused by chill due to atmospheric influences; hence its common designation, "a stroke of the wind." I need hardly say that the baneful effects of chill, particularly in warm climates, are far greater when the air is laden with moisture than when it is dry, because under the former condition the evaporation of perspiration is checked, while

sweat bedews the body, and the superficial vessels become congested. If, when in this state, the animal be exposed to a cold, dry wind, there will be contraction of the bloodvessels of the surface of the body, with a corresponding rush of blood to the underlying tissues, which determination of blood may readily cause congestion of the bloodvessels of the spinal cord, with consequent paralysis, owing to pressure on the nerve fibres, caused by the presence of fluid which escaped from these vessels when they were in a congested state. From the effects of chill, we have in England, now and then, instances of paralysis due to congestion of the spinal cord with symptoms not unlike those of acute kumree.

The theory has been more than once started that kumree is caused by the eating of ergotised grain, and not by climatic influences. This view appears to me to be quite untenable. (1) Because native ponies and horses, in districts where kumree is prevalent, enjoy a far greater freedom from its attacks than do imported animals, which are kept under like conditions of feeding, stabling, and general management. (2) Because the symptoms of poisoning by ergotised grain are quite different from those which herald in kumree. The action of the poison of ergotised grain is specially evinced by impairment of the general health, which may be followed by grave derangements of the system, paralysis among the rest. Nothing of this occurs in cases of kumree which appear here and there among numbers, of horses living under the same conditions of feeding. as in batteries of artillery, and in regiments of cavalry. Were a kumree-producing poison derived from ergotised

grain, we might expect that the general health of several would be seriously affected, and that paralysis might ensue in some few cases. But, on the contrary, the attack in individual instances is sudden and unexpected, or slow and insidious without impairment of the general health beyond the manifestation of debility, while the condition of the other horses is not specially affected. The horse may have finished his gallop on the racecourse strong and well, or may have carried his master on parade with all his wonted fire and light-heartedness, and yet in half an hour after arriving at his stable he will be paralyzed and helpless, without having shown any premonitory symptoms of constitutional disturbance.

If we admit the truth of the ergotised grain theory, I submit that even then the probability is that the poison acts by causing congestion of the vessels of the spinal cord. If this be the case, the proper treatment will be identical to that indicated in cases induced by chill. Thus the principles of treatment will be the same whichever theory we accept.

Respecting congestion, Dr. Bennett in his Clinical Lectures observes, "In the same manner are explained all the varied phenomena of hysteria and spinal irritation, for inasmuch as the spinal cord furnishes, directly or indirectly, nerves to every organ of the body, so congestion of this or that portion of it may increase, pervert, or diminish the functions of the nerves it gives off, and the organs which they supply. Congestion, therefore, we conceive to be the chief cause of functional nervous disorders originating in the great cerebro-spinal centre."

The theory that a horse affected by "worm in the eye" will subsequently suffer from kumree has been frequently advanced in India. Experience, however, does not bear it out. We may safely say that there is no *necessary* connection between the two diseases, though it is quite possible that the presence of one of these minute parasites in the spinal cord might set up inflammation which would assuredly cause pressure on the nerve fibres and consequent paralysis.

Preventive Measures.—The horse should be warmly clothed, according to the season of the year, at night, and at other times when the temperature of the atmosphere is liable to fall. I may say, in passing, that, as a rule, a horse should be clothed, when he is in the stable, as warmly as possible, just stopping short of what would make him sweat. Precautions should be taken to prevent the animal getting chilled, especially after work. His body should on no account be washed. It is a good plan, when the horse is picketed in the open, to protect his spinal cord from the direct rays of the sun, or from the effects of chill, by placing a folded blanket over his back and loins. Attention should be paid to his feeding, stabling, and exercise.

The foregoing remarks specially apply to the management of horses kept in districts where kumree is known to appear.

Treatment during the First Stage of the Disease.—The treatment generally pursued in India has been, on the whole, eminently unsuccessful, as might be inferred if we accept the congestion of the spinal cord theory; the usual means employed being blistering and firing the loins, and the internal administration of strychnine.

Let us for a moment consider the condition of the parts suffering from spinal congestion. The vessels are gorged with blood, while the pressure on the nerve fibres caused by this congestion produces the paralysis. Here the rational treatment is, I submit, removal of the cause. If we fire or blister along the spinal cord, we shall determine an increased supply of blood to the already over-distended vessels, thereby adding fuel to fire; the same action is brought about by giving nux vomica, or strychnine, its active principle, for the action of this drug seems to be peculiarly directed to paralyzed structures in increasing the supply of blood to them.

A sharp purgative is indicated, for by irritating the bowels it causes a large quantity of blood to be determined to them, thereby relieving the congestion of the spinal cord. It also diminishes the volume of the blood-mass by depriving it of a considerable portion of its watery constituents. The use of belladonna is also specially indicated, its action being to relieve congestion by causing contraction of the muscular coats of the bloodvessels. Mr. Finlay Dunn, in his work on Veterinary Medicines, thus describes its properties:—"Belladonna is a direct stimulant of the sympathetic nervous system. It hence increases the number and force of the heart's beats. It gives tone to dilated and congested capillaries. In the web of the frog's foot it has been seen to contract the ramifications of the arteries often to less than three-fourths of their former calibre, inducing such increased movements of the red globules, that about twice the former quantity of blood passed along them" (*Meuriot and Harley*).

The use of the carbonate of ammonia would appear

to be called for, because it strengthens the action of the heart, and tends to preserve the fluidity of the blood—two influences that are directly opposed to a state of congestion.

Warm fomentations would be most beneficial, for their special influence is to soothe local irritation, chiefly, it is supposed, by assisting the swelling of the part, which relieves the nerve fibres of pressure.

Laxative food, warm clothing, plenty of water to drink, and pure air are specially demanded, in order to preserve the purity and fluidity of the blood.

From the foregoing observations I think we may safely adopt the following procedure during the first stage of this disease, viz., to give a sharp purgative and to administer a drachm of extract of belladonna in a ball three times the first day, and twice a day after that; and a drachm of carbonate of ammonia three times a day in cold water or cold gruel as a drench, as hot fluids are liable to decompose it. As the extract of belladonna is apt to deteriorate, especially in hot climates, we might, in cases of doubt, use its active principle, atropine, which possesses all the good qualities of the drug. Mr. Finlay Dunn states that the sulphate of atropine is the most stable and convenient form. It may be given in doses of one grain. Apply continued warm fomentations over the loins for several days; during the intervals between the fomentations smear the part over with extract of belladonna, or place a folded blanket, which has been dipped into hot water and then wrung out, over the loins, and cover it with some waterproof material, so that it may act as a continued poultice. Above all things do not allow the animal to get chilled

while these fomentations are being persevered with. The legs should also be fomented with warm water, well hand-rubbed, and warmly bandaged. Hand-rub the surface of the body, and keep the animal comfortably clothed. Give bran and linseed mashes, roots, and green fodder.

If the animal can stand fairly well, slings may be of use, for it is quite possible that the local congestion may be increased by the recumbent position. If the paralysis be considerable, slings should not be employed, as the consequent pressure on the abdomen would interfere with digestion. The practitioner should exercise his own judgment on this point.

If the animal is unable to stretch himself out in order to void his urine, the catheter should be passed five or six times a day.

Treatment of the Second Stage.—A fortnight after the primary attack we may consider that the first or inflammatory stage has passed, and that, if paralysis still continues, it is due to the pressure of the fluid (lymph) which has escaped through the walls of the inflamed bloodvessels. Congestion, if it be very temporary, may pass off without any fluid escaping, but if it continues, lymph will exude through the walls of the bloodvessels, and we shall have inflammation of the part. In fact, congestion is but the first stage of inflammation. The swelling that we observe in inflamed tissues is due to this exudation of lymph.

In this second stage our object should be to remove the lymph which presses on the nerve fibres and causes paralysis. In fact, the process of inflammation here is identical to that which results from sprains. (See

Chap. I.) Hence our endeavours should be directed to encourage the reparative action of nature, by determining an increased supply of blood to the part for the absorption or breaking up of this new formation. With this end in view we may give a drachm each of nux vomica and of iodide of potassium twice a day, gradually increasing the former to two drachms. The latter is tasteless, so may be given in the water, while the horse will readily eat the nux vomica if mixed in his food. I prefer it to its alkaloid strychnine on account of its stomachic properties in improving the appetite. It should be discontinued as soon as any nervous twitchings make their appearance in the muscles of the animal, or when his appetite begins to fail.

For cases of poisoning by nux vomica, or by its alkaloid strychnine, the best antidote we possess is the active principle of tobacco, nicotina. We may employ it as follows :—Boil ¼ lb. of strong tobacco in a quart of water for a minute or two ; and give half a pint of the decoction mixed in a pint and a half of cold water as a dose. Or administer 10 minims of nicotina in a pint of water. In case of an over-dose of tobacco give drenches of half a pint of spirits in a pint of water.

The iodide of potassium is given to encourage the absorption of the lymph.

Keep up the strength with liberal feeding, and give half a drachm of sulphate of iron twice a day in the food.

Blister along the spinal cord over the loins and down to the tail with—

Biniodide of mercury - - -	1 part,
Lard - - - - - -	16 parts ;

and keep up the irritation by rubbing in a little of this ointment from time to time. The object of this is to encourage an increased supply of blood to the part for the removal of the deposit. If this fails, fire deeply on both sides of the spinal vertebræ, over the loins down to the root of the tail.

I prefer the biniodide of mercury to cantharides in this case as a blister, as its effect is less irritating to the horse, and it is not apt, like the Spanish flies, to cause derangement of the urinary organs. Besides this, it seems to encourage the process of absorption.

I believe that the French veterinary surgeons, in the island of Mauritius, recommend that the operation of docking should be performed immediately after an attack.

I may mention, as an interesting physiological point, that the first step in the change of muscular tissue suffering from paralysis, is the obliteration of its transverse striæ; in fact, it begins to assume the character of fibrous tissue.

Tetanus, or Lockjaw,

Is continued contraction of the voluntary muscles. (*Bennett.*) It may be the result of an injury, or may come on without any assignable cause. In the former case it is called traumatic, in the latter idiopathic tetanus. Authorities are divided in opinion as to which is the most serious form. The weight of evidence seems to point to traumatic tetanus as being the more dangerous kind.

Tetanus is a most fatal disease. It runs its course in from one to six weeks. "There are some cases of tetanus so acute from their commencement that it is quite hopeless to expect any but a fatal termination; and in every case where all the symptoms are firmly established before the fourth day of attack, death may be expected. But in cases where the symptoms are slowly developed, some movement of the jaws still remaining, the exacerbations not very severe—more especially if the animal possess a calm quiet temper, and lives over the ninth day,—a recovery may be expected." (*Williams.*) Little or nothing is known regarding the morbid condition of the nervous system which produces this disease.

Symptoms.—The muscles that are usually affected by the continued spasm, are those of the jaws, neck, and back; hence we have the mouth closed, the nose poked out, the head elevated, the neck "ewed," the back hollowed and the tail raised. There is great stiffness and rigidity of the body. The eyes are sunk, and the haws partly drawn over them. The animal looks nervous and terrified. The nostrils are dilated, and the flanks tucked up. These symptoms generally come on gradually. Although there is continued cramp of the muscles, still the patient suffers from aggravated spasms from time to time, the slightest noise or excitement being often sufficient to bring them on. The bowels are constipated, and there is often retention of urine, from the horse being unable to stretch himself out.

Treatment.—Place the animal in slings as soon as possible. "I recommend the slings because many

horses which are in a fair way of recovery lie or fall down when the muscles begin to relax, and, when down, struggle and fight to such an extent that they seldom recover from the excitement and renewed severity of the disease thus brought on. The surroundings of the patient are of the utmost importance; the stable must be darkened; should contain no other horses; be situated in a quiet spot, removed from noises, and the door must have a lock, the key of which is to be kept by one individual (the veterinary surgeon, if possible), who is to visit the patient, at most twice a day, and great care must be taken that the animal is not tormented by flies." (*Williams.*) Beyond following these excellent directions little can be done towards alleviating the disease. The most successful medicinal treatment appears to consist in giving a strong physic ball, say from eight to ten drachms of aloes, if it can be administered without unduly exciting the animal, while four drachms of extract of belladonna may be given in a day as a sedative. It may be placed, at the time of the spasms, between the animal's grinders (molar teeth), and then allowed to gradually dissolve. He should have a plentiful supply of nutritious gruel, milk and eggs, &c. Owing to the long continuance of this disease, medicines are of little use, perfect quietude being the chief consideration. If a wound has been the exciting cause, apply warm fomentations to it.

Stringhalt

Is a convulsive spasm of the muscles which bend the leg. The foot is picked up with a peculiar snatch. In mild cases it may be observable only when the horse begins to move, or from time to time as he progresses ; but in bad cases it may be perceived at every step he takes. It is almost always confined to the hind legs, sometimes affecting both of them. This disease almost invariably gets worse with age. I think slight cases of stringhalt are more readily seen in the horse's stall, on turning him round from side to side, than when he is taken outside. The causes of this complaint are obscure, though they are undoubtedly due to pressure on the nerves which supply the affected limbs. It is quite incurable, although, if aggravated by hard work or by injury, the symptoms may be relieved by the usual means, such as rest, physic, warm fomentations, &c. It is principally found among cart-horses, and is an unsoundness. It is very common among cart-horses in Edinburgh, probably on account of the severe strain thrown on the hind legs when ascending and descending the steep inclines which are to be found in that city.

CHAPTER XVIII.

Detection of Lameness.

In no branch of veterinary knowledge is professional skill better displayed than in the detection of lameness, which the ordinary amateur, unless in very obvious cases, will find a most perplexing affair. I would strongly advise the horse owner to consult a veterinary surgeon on all questions of soundness, for no one who has not undergone some professional training is competent to thoroughly investigate such points. Besides this a M.R.C.V.S. is the only person whose opinion is, legally, worth anything. However, as horses frequently go lame, and as owners, especially in India and the Colonies, are often unable to procure the assistance of a veterinarian, I beg to offer the following notes on the subject.

We may consider the detection of lameness under two aspects:—(1) When the man who "shows off" the horse endeavours to make him stand or move in an apparently sound manner. (2) When the examination is entirely under one's own control.

In the first case an unwary purchaser may be easily deceived by a clever "coper," whose usual dodges are as follows:—

Before the horse is brought out of the stable he is "warmed up" by being threatened with the whip and

voice, so that he may forget the pain in his feet and legs, and be ready to dance and prance about at the slightest sign from his inhuman master.

The softest ground is chosen on which to show off his action.

Some excuse will be framed for not letting him trot; but if that pace be insisted on, he will, if led, be held tight by the head, which will be kept in a raised position, so as to prevent him from "nodding" it. He will be led on the sound side, if lame in front, with his head turned away from the affected limb, or he may be ridden with a sharp bit and tight curb chain.

If the horse be lame on one fore leg, and it be feared that a somewhat strict examination will be made, the coper may "bean" the sound leg. In former days this operation was performed by inserting a piece of iron or other substance, resembling, in some slight degree, a bean in form—hence the name—between the shoe and the sole of the foot, so that the animal was made as lame on the sound limb as he was on the diseased one. His apparent stiffness of gait might then, if remarked upon, be accounted for by alleging want of action, natural manner of going, &c. This operation was at best but a clumsy contrivance, for it was always open to detection on examination of the foot, or on removal of the shoe. Now-a-days they bean in a far cleverer way by paring down the foot, after removing the shoe, so that the horse will go tender when it is put on again. By practice men learn to regulate the degree of tenderness with great skill.

Leaving the copers to the prosecution of their nefarious trade, we will consider the examination of the horse under the most favourable circumstances.

Mr. Percivall defines lameness "as the manifestation in the act of progression, by one or more of the limbs, of pain or weakness, inability or impediment." Under this heading we may, for convenience' sake, include "pointing" of the foot, any unnatural position assumed by the horse, and altered action which indicates unsoundness. Irregularity of gait is commonly supposed to constitute lameness, but we may have a lame horse going level when he is equally affected in both fore, or in both hind legs. Although deficiency of action is its usual cause, we find that in stringhalt lameness is due to its excess.

In the examination of a horse for lameness we should first endeavour to find out the affected leg, and then we should try to discover the seat of the disease in that limb. When it pains a horse, whether moving or standing still, to put the natural share of weight on any particular leg, or to bend it, or when he is unable to bend it with freedom, he is then *lame*. Hence, to detect lameness, we should endeavour to observe any tendency to favour one limb, or disinclination or inability to bend it; or any want of freedom in the gait.

Pointing.—Our first step should be, if possible, to see the animal in the stable when he is standing quietly, and is free from all excitement. He will then, *if sound*, generally rest one hind leg by bending its fetlock, while he keeps both fore legs firmly planted. He will, after a time, ease the other hind leg, which, in its turn, will be relieved by its fellow, and so on. Although he may stand with one fore leg slightly advanced beyond the other, still it will never, unless when diseased, be relieved of its own share of weight, for he will always

stand, when on level ground, with an equal bearing on both fore legs.

If we find that the animal points with one foot, while maintaining a position which indicates that he prefers to stand in a constrained attitude than to put weight on it, we may reasonably suspect that limb.

As a general rule, when the disease is in the front of the foot, the animal rests his heel on the ground; when towards the heel, he points with the toe. The former is the case in laminitis, and generally in ring-bone; the latter, in confirmed navicular disease.

In almost all cases of pointing, when the disease is not in the foot, the horse keeps the foot flexed, and the heel consequently raised.

In bad cases of lameness in the hind leg the animal often keeps the foot altogether off the ground.

At the commencement of navicular disease the horse sometimes points with the heel down, but he soon commences to bring the toe only to the ground, and to "round" the fetlock joint. "In other cases the patient will stand perfectly firm, although in the great majority of cases the pastern of the lame limb is more upright than that of the sound one, as if he feared to put much weight on it." (*Williams.*)

Lameness is often manifested by the horse frequently shifting his feet when standing.

"The pointing of elbow lameness is characteristic, the fore-arm being extended, the knee in a state of flexion, and the foot perhaps on a level with, or posterior to its fellow. In severe shoulder lameness, the pointing, if it can be called such, is backwards, the limb relaxed, knee bent, and the foot posterior to its fellow; some-

times the toe only touches the ground; the whole limb semi-pendulous, consequent upon the inability of the muscles to elevate and bring it forward without pain." (*Williams.*)

In laminitis, when the disease is in front, the horse advances his fore-feet, so as to relieve the toes of pressure; when behind, he draws back his fore-feet, and advances his hind with the same object.

Animals affected with navicular disease often acquire the habit of lying down a great deal in their stalls.

Cases of slight lameness behind, such as those of spavin and stringhalt, are often best seen when the horse is pushed over from one side to the other, or when turned round in his stall. We may then observe that the horse shifts the weight on to one hind leg quicker than he does to the other, which we may regard as the unsound limb.

Detection of Lameness during Movement.—Lameness must be very acute for the horse to show it in the walk. As a rule, the slow trot is the best pace at which to observe lameness. The animal should be led in a halter or snaffle bridle with plenty of rein, so that the man who leads him may not interfere with the movements of his head. As soon as possible after leaving the stable, the horse should be trotted for inspection on hard ground, which should be free from stones and inequalities. The observer may stand about twenty yards in front of the horse and on the near side. He should note, as the animal approaches, whether he "dwells" in the slightest on one fore-foot more than on the other, and whether he nods his head. If he does either, the observer may conclude that he dwells on the

sound limb, and nods his head as it comes to the ground, while the other is the lame leg, which the animal naturally favours by throwing the weight on its fellow. An exception to this is when a horse is very lame on a hind leg, the near one for instance; he may then nod his head on the off fore coming to the ground, so that he may throw as much weight in front as possible; this he naturally does to the sound side. When a horse is very lame in front he may chuck up his head on the lame leg coming to the ground.

"A horse lame in both fore-feet, although he may not drop in his gait, will be short in action; will go, as it has been more forcibly than elegantly expressed, 'like a cat on hot bricks.' Each foot is carefully put to the ground, and quickly lifted up again, while at the same time there is a rolling motion of the body." (*Williams.*)

When a horse is suspected of being equally lame on both fore-feet, he should be taken on to soft ground, and there slowly trotted. If a marked amendment in the gait is then observed, one may regard one's suspicions as confirmed.

As the chief portion of the weight of the horse's body is borne by his fore-legs, he will not, unless when very lame, dwell on one hind foot more than on the other, but will endeavour to keep the weight off the unsound limb by "hitching" up its quarter, and consequently keeping it straighter than its fellow. Hence, when the animal has passed the observer, he should take a rear view of the croup, and should mark whether one quarter rises more than the other as their respective feet come to the ground.

When the horse has trotted past about thirty yards, he should be turned, somewhat sharply, to the right about (for instance), while the person who is examining him should note the manner in which he turns on his off hind leg, so as to be able to compare it with the way he goes to the left about the next time he turns. In this second trot past, the observer should try to detect if there be any difference in the action of the horse, as viewed from the off side, from that which it presented when regarded from the near.

If after two or three trots past, there be still any doubt remaining, perhaps the best way to solve it is to mount the animal and trot him, alternately slowly and rapidly, for a short distance on hard ground, and give him a few moderately sharp turns.

If we suspect the existence of spavin, we may take up the foot and bend the hock, retaining it in that position for a couple of minutes; if after that the animal trots quite sound, we may consider the joint to be all right.

Before putting the horse in, we should try if he backs with freedom and regularity of gait.

If no lameness be noticed, we may send him back to his stable, and, as a final test, may allow him to stand for a few hours, and then, when he has thoroughly cooled down, try him again. If he passes satisfactorily through this second ordeal, we may, as a rule, regard him to be sound in limb.

Certain obscure cases of lameness can be detected only during the first few steps the animal takes on quitting his stable, for after that he may "work sound." Such cases of lameness are usually caused by insidious

and serious disease at its early commencement. They are quite beyond the skill possessed by the ordinary amateur.

Lameness at its first commencement, in the cross country horse, is often evinced by want of customary freedom and boldness in fencing; while in the race-horse, by a slight shortening of stride, by unaccustomed inability to "act" well on hard ground, by his showing an unusual preference for leading with one leg rather than with the other, or by his changing his leg oftener than he was wont to do.

Peculiarities of Action.—"Some horses, from bad riding or driving, acquire a sort of *hitch* or *lift* in their trot." (*Percivall.*)

"There are some horses which walk downhill in so peculiar a manner that they may be supposed to be lame. This kind of walk has been termed a three-cornered walk. The animal sways from side to side most awkwardly; his hind quarters being turned to one side or the other, going forwards *broadside on*, similar to an animal going downhill with a heavy load behind him." (*Williams.*)

If a sound horse, when trotting, has his head turned towards the man who leads him, going in a sort of "left shoulder in" fashion, he may appear to be lame on the near fore-leg, on account of stepping shorter with it than with the off fore.

Some horses, when trotting very fast, appear to go lame behind, by reason of the hind legs not being able to keep time with the fore.

I have known a horse always to go lame in harness, although he went quite sound in saddle; the cause

being that, on a previous occasion, when working between the shafts, one of his shoulders became galled, and continuing the work for some time in this state, he acquired the habit of bearing against the collar as much as possible with the other shoulder.

Intermittent Lameness is often caused by rheumatism, and may also characterize the early stages of navicular disease.

Lameness improves with exercise, except, as a rule, in cases of splints, sore shins, corns, chronic laminitis, inflammation of the coronet (villitis), and sprains.

A horse suffering from navicular disease goes uphill sounder than he goes down; the reverse is the case in laminitis.

When an animal is lame behind, the disease is generally in the hock; when in front, in the feet of cart-horses, or in the suspensory ligaments of those that are used for fast work.

When a horse goes lame on a fore-leg without any perceptible cause, and wears away the toe of the shoe, we may suspect that foot of navicular disease. But if he goes on the heel, the probability is that he has either laminitis or incipient ring-bone. If the lameness be behind and the toe becomes worn, we shall generally find that it is due to spavin.

Side-bones are almost peculiar to cart-horses, sore shins to race-horses, and navicular disease to cab and carriage horses. Ring-bones are rarely met with except in cart-horses. Navicular disease and occult spavin are hardly ever found in horses under seven years of age.

CHAPTER XIX.

Veterinary Medicines.

N.B.—The doses of the medicines prescribed in this book are calculated for what would be suitable for an average hunter or charger 15 hands 2 inches high, and 5 years old or upwards.

Doses according to Age.

For a yearling	-	$\frac{1}{3}$ that for an aged horse.
For a two-year-old	-	$\frac{1}{2}$,, ,,
For a three-year-old	-	$\frac{2}{3}$,, ,,
For a four-year-old	-	$\frac{3}{4}$,, ,,
For a five-year-old	-	full dose.

Doses according to Size and Class.

For a 15.2 hunter or charger, as laid down.
For a heavy cart-horse, $\frac{1}{4}$ more than for a hunter.
For a 14-hand pony, $\frac{1}{5}$ less than for a hunter.
For a 13-hand pony, $\frac{2}{5}$ less than for a hunter.

List of Medicines for a Stable of Five or Six Horses.

N.B.—For the benefit of my Indian readers I have marked with the letter (*b*) those medicines which may be procured in Indian bazaars.

1. *Indispensable Medicines.*

Alum (*b*) - - - - - -	1 lb.
Carbolic acid* - - - - -	1 pint.
Linseed oil (*b*) - - - -	4 pints.
Tincture of opium - - -	1 pint,
or—	
Solid opium (*b*) - - - -	2 oz.
Turpentine, oil of (*b*) - - -	1 pint.

2. *Very Useful Medicines.*

Aloes (*b*) - - - - - -	8 oz.
Ammoniæ, strong liquor - -	4 ,,
Bluestone - - - - - -	1 ,,
Camphor (*b*) - - - - -	4 ,,
Iron, sulphate of (*b*) - - -	2 ,,
Mercury, biniodide of - - -	½ ,,
Nitre (nitrate of potash) (*b*) - -	1 lb.
Nitre, sweet spirits of - - -	1 pint.
Soda, bicarbonate of (baking) (*b*) -	2 lbs.
Tartar emetic - - - - -	4 oz.

3. *Useful.*

Aconite, Fleming's tincture of -	¼ oz.
Ammonia, carbonate of - -	2 ,,
Arnica, tincture of - - -	8 ,,
Arsenic (*b*) - - - - - -	2 ,,
Belladonna, extract of - - -	4 ,,
Cantharides - - - - - -	¼ ,,

* Calvert's disinfecting carbolic acid may be substituted for the glacial and more expensive form. When given internally, a third more of it should be used than what would be required of the pure acid.

Catechu (*b*) - - - - -	2 oz.
Corrosive sublimate - - -	2 ,,
Epsom salts (sulphate of magnesia)	2 lbs.
Goulard's Extract - - -	1 pint.
Ipecacuanha - - - -	4 oz.
Iron, tincture of - - - -	4 ,,
Nitric acid - - - - -	2 ,,
Nux vomica (*b*) - - - -	2 ,,
Potassium, iodide of - - -	2 ,,
Sal-ammoniac (*b*) - - - -	2 lbs.
Silver, nitrate of - - - -	½ oz.

Actions and Uses of Medicines.

Acetic Acid

Is used for removing warts from delicate parts.

Aconite

Is a sedative to the action of the heart. It is used in the form of Fleming's tincture of aconite. Dose, 7 to 10 drops. It is not a very safe medicine in the hands of amateurs.

Ale, Beer, and Stout

Are excellent tonics, especially when the horse is recovering from the effects of some debilitating disease. A quart may be given three times a day.

Aloes

Is the usual purgative employed in veterinary practice. It ought to be employed with great care by amateurs,

as its injudicious administration is most dangerous to the lives of horses to whom it may be given. Linseed oil will generally prove an efficient substitute.

Barbadoes Aloes is the dried juice of the leaves of the aloe plant which is grown in the West Indian islands. There are several other varieties, but their action is not as certain as that of the species we are considering.

Characters.—The best is of a liver-brown colour, presenting a dull fracture when broken, and of a dull yellow appearance when reduced into powder, an operation which is accomplished with some difficulty, but which may be overcome by adding a few drops of ether. It is completely soluble in boiling water.

Composition.—It is composed of its active principle, aloine, mixed with certain resins and other substances.

Actions.—In small doses it appears to act as a tonic* or alterative† in improving the general health of the animal. In full doses it is a purgative, acting sometimes as a diuretic. *Externally* it is used in the form of a fine powder, as an application to wounds.

It is rapidly absorbed into the system, and seems to be excreted into the large intestines, thereby increasing their motion.

Aloes generally takes from eighteen to twenty-four hours to produce a purgative effect.

As it appears to be a liver stimulant, one should be careful in giving it in cases of disease of that organ.

* Tonics are medicines which have a good effect on the general health.

† Alteratives have certain beneficial though ill-understood effects on the system.

Doses.—As a tonic or alterative, 1 to 2 drachms; as a purgative, from 4 to 10 drachms.

The action of this drug is influenced by the breed and individual peculiarities of the animal, by the country in which he lives, by the nature of the food he eats, by the condition of his stomach at the time he takes the physic, by his state of health, and by the nature and quantity of the food and drink which he partakes of after getting the physic. Hence, as a rule, the cart-horse can take a very large dose with impunity, while a small one will move the thoroughbred.

Some horses, especially slack-loined, "washy" animals, are very easily purged. In Scotland, horses require about one-and-a-half times the amount of aloes which would do in the south of England or in Ireland. This, I believe, is owing to the large amount of woody fibre contained in the hay made in the first-mentioned country. My experience in India is that horses there are very amenable to the action of aloes. Animals fed chiefly on corn are more difficult to purge than are those which are kept on grass and other green food. When restricted to bran mashes the bowels are readily acted upon. If aloes be given on an empty stomach its effects will be far more severe than if that organ were in a full condition. Drinking cold water soon after this drug is given increases its purgative effect. When there is irritation of the bowels—which may be manifested by diarrhœa or by the presence of mucus in the dung—and, generally, if there be existing any acute affection of the chest or air passages, purgation is easily excited by a moderate dose of aloes.

Hence it should not be used as long as the conditions just mentioned exist.

For an ordinary horse, such as a hunter or trooper, 4½ or 5 drachms will usually be sufficient as a purgative; while 6 drachms may be given to the cart-horse. In Scotland the latter may safely get an ounce. In India I have usually found 4 to 4½ drachms quite enough for an ordinary animal.

Modes of Administration.—In most cases I would advise that the aloes should be given in a ball instead of in a drench; for if the latter method be adopted a considerable portion of the resins contained in the drug will, on cooling, adhere to the sides of the vessel in which the aloes is dissolved, and become consequently lost. I may remark that their presence appears to materially assist the effect of the active principle, aloine. Besides this, in drenching there is danger of a part of the fluid getting spilt. If this occurs, it will be impossible to tell how much has escaped. Aloes is nearly, if not quite, as rapidly absorbed in a solid as it is in a fluid state; while, if given in the former condition, no uncertainty can exist as to the quantity swallowed.

If a physic ball does not act in a day or two, a second bolus should on no account be given for at least a week, lest severe if not fatal super-purgation may ensue. The same rule should be observed if a ball breaks up in a horse's mouth. One should remember that the longer aloes takes to act the greater is the danger of super-purgation.

Alterative Ball.

Barbadoes aloes - - -	$1\frac{1}{2}$ drachms.
Tartar emetic - - -	1 drachm.
Nitre - - - -	3 drachms.

Treacle or lard sufficient to form a ball.

Physic Ball.

Barbadoes aloes - - -	5 drachms.
Ginger - - - -	2 ,,

Treacle or lard sufficient.

Strongly Purging Ball.

Barbadoes aloes - - -	6 drachms.
Calomel - - - -	1 drachm.
Ginger - - - -	2 drachms.

Treacle or lard sufficient.

If required for immediate use, a ball may be made up by simply adding a little water to the powdered aloes, without any treacle or other substance to make its particles adhere together.

Physic Mass, as used at the New Veterinary College, Edinburgh. (To be kept ready for immediate use.)

Barbadoes aloes - - - -	3 lbs.
Ginger - - - - -	$\frac{3}{8}$,,
Olive oil - - - - -	$\frac{3}{8}$,,
Treacle - - - - -	$\frac{1}{2}$,,
Spirits of wine - - - -	$\frac{1}{4}$,,
	$4\frac{1}{2}$ lbs.

For every drachm of aloes take $1\frac{1}{2}$ drachms of this mass.

The following mass keeps well, and has been strongly recommended to me :—

Physic Mass.

Barbadoes aloes - - - -	30 oz.
Cut Castile soap - - - -	3 ,,
Castor oil - - - - -	6 ,,
Syrup of buckthorn - - -	6 ,,

Boil together, and, while cooling, add—

Powdered aniseed - - -	3 oz.
,, ginger - - - -	3 ,,
,, jalap - - - -	3 ,,

Add slowly—

Carbonate of potash - - -	2 oz.
Water - - - - - -	4 ,,

After dissolving the potash, stir the mixture well. For each drachm of aloes use two drachms of this mass.

Solution of Aloes.

Powdered Barbadoes aloes - -	1 part.
Water - - - - -	7 parts.
Spirits of wine - - - -	1 part.

Dissolve the aloes with the water in a water bath, which consists of a vessel placed inside another vessel containing water, so that, when heat is applied to the outer vessel, the contents of the inner one cannot be raised above boiling-point. When the aloes is dissolved, add the spirits of wine. An ounce of this solution will contain a drachm of aloes.

If time be an object, the aloes for a drench may be dissolved in a pint of warm water.

A quarter more aloes than would be required for a ball may be allowed for a drench, in order to make up for loss by spilling.

Management of the Horse before and after giving Physic.—For at least a day before the physic is administered, the animal should be restricted to bran mashes and hay, while the allowance of the latter should be somewhat restricted on the last night. "The physic is given on an empty stomach, early in the morning; immediately afterwards a bran mash is given; that over, the horse goes to exercise for perhaps an hour, watered when he returns. The water should be as warm as he will take it, and he should have as much as he pleases throughout the day. Bran mash should be given as often as corn usually is, and better warm than cold; if both are refused, bran may be tried, but no corn, and but little hay. Sometimes gentle exercise may be given in the afternoon, and also next day. The physic usually begins to operate next morning, though it rarely takes effect in twelve hours, frequently not for thirty. When the physic begins to operate, the horse should stand in the stable till it *setts*, which may be twelve hours." (*Dick.*)

Alum

Is soluble in 18 parts of cold water. Its astringent effect is owing to its power of coagulating albumen. Dissolved in water it forms a useful astringent lotion for wounds. *Burnt Alum* is prepared by heating to dryness alum placed over a fire on a metal or earthen plate.

Ammonia.

S. G. ·850, is used in making stimulating applications.

Soap Liniment.

Soap	- - - - - -	2 oz.
Strong liquor ammoniæ	- -	1 ,,
Water	- - - - - -	4 pints.

Boil the water and dissolve the soap in it. When cold add the ammonia.

Stimulating Liniment.

Soap liniment	- - -	½ pint.
Strong liquor ammoniæ	-	1 to 2 drachms.

Ammonia, Carbonate of,

Is a most valuable stimulant. *Dose*, 1 to 2 drachms. If given in a drench, it should be largely diluted.

Ammonium, Chloride of (Sal-ammoniac).

Its beneficial effects in cases of disease of the liver are well marked.

Arnica.

Internally it is a useful stimulant. It appears to have a special action in increasing the superficial circulation.

Dose of the tincture, 1 to 2 oz.

Externally, a wine-glassful to a quart of warm water is useful as an application to recent sprains.

Arsenic

Is an alternative and tonic. Its good effects, when given *internally*, are well marked in skin diseases. It should not be given continuously for more than ten days at a time, as it accumulates in the system, and may tend to cause corrosion of the coats of the stomach

and intestines. *Externally* it is used for "coring." The chief symptoms of arsenical poisoning are swelling of the eyelids and flowing of tears. Its best *antidote* is freshly-prepared sesquioxide of iron, to be given in doses of from 15 to 20 times the amount of arsenic taken.

Dose, from 5 to 10 grains.

Arsenic is most conveniently given in the form of—

Liquor Arsenicalis.

Arsenic - - - - -	1 part.
Carbonate of soda - - - -	1 „
Water - - - - - -	96 parts.

Boil together until the arsenic is dissolved. Each ounce of this solution contains five grains of arsenic. Fowler's solution, which is used in human practice, contains four grains to the ounce. It is slightly scented, which makes it objectionable for veterinary use.

Beer.

See "Ale."

Belladonna.

Smeared *externally* over a painful spot, is useful in allaying pain.—See "Camphor." See pages 376 and 377.

Blisters.

See "Cantharides" and "Biniodide of Mercury."

Bluestone,

Or sulphate of copper, is a useful caustic.

Bran

Is a laxative when used as a mash, but when given dry it seems to have a constipating effect.

To make a Bran Mash.—Scald a stable bucket with boiling water, then put into it about 3 lbs. of bran, with an ounce of salt, and add as much boiling water as the bran will take up, which will be about an amount equal in weight to the bran itself, calculating the gallon of water to weigh 10 lbs. The mash should then be well covered up, so as to keep the steam in, and it should be left to stand thus till it gets cool enough for use, which will be in about a quarter of an hour or twenty minutes.

Calomel

Is useful as an application for "thrush," and is employed *internally* to increase the purgative effect of aloes.

Camphor

Is a very useful sedative. Given internally it has a peculiarly soothing effect on the mucous membranes.—

Anodyne Application.

Camphor - - - - - -	1 part.
Extract of belladonna - - -	2 parts.

Dissolve the camphor in a little spirit, and make the application of sufficient consistency to adhere to the skin by the addition of a little gum.

Camphor may be used for removing worms from the intestines of the horse in doses of 2 drachms a day in a ball, or dissolved in alcohol.

Camphor appears to be chiefly eliminated by the lungs, while a small proportion of it passes off with the urine.

See "Carbolic Acid" (Phenicated Camphor).

Cantharides.—Blistering Ointment.

Powdered cantharides - - -	1 oz.
Lard (free from salt) - - -	8 „

Place in an earthenware pot, which should be put into a kettle or other convenient vessel containing water, so that the mixture cannot be raised above boiling-point. Keep the water in the outer vessel simmering over a fire for five or six hours, and stir up from time to time. Strain and let cool.

Tincture of Cantharides

(for blistering the skin).

Powdered cantharides - - -	1 oz.
Spirits of wine - - - -	1 pint.

Place in a bottle, which should be then corked, and should be shaken up from time to time. After the mixture has been treated thus for about a week, filter it through blotting-paper.

Carbolic Acid.

There are three forms of carbolic acid in general use, viz., the pure or glacial form, Calvert's disinfecting, and crude carbolic acid. The first, except perhaps for internal use, is too expensive for employment in ordinary veterinary practice. When given internally a third more of Calvert's preparation should be employed than would be necessary with the purer form. Crude carbolic acid, which is very cheap, may be used externally and as a disinfectant.

When carbolic acid is dissolved in water, its effect is

stronger than when in combination with a similar quantity of oil or glycerine.

The action of carbolic acid in destroying disease and putrefactive germs is well marked.

It (especially the impure kind) is sparingly soluble in water, but combines with glycerine in the proportion of 1 to 4, and may then be diluted by water to any required strength.

Carbolic acid combines with camphor in the proportion of 1 to 2½.

It is used *internally* in cases of anthrax or Loodiana fever.

Externally it is used as a caustic (pure), or as an application to wounds (1 to 40 of water, or 1 to 20 of glycerine or oil).

Phenicated Camphor.

Carbolic acid - - - -	1 part.
Camphor - - - -	2½ parts.

Antiseptic Application for Wounds, etc.

Carbolic acid - - - -	1 oz.
Camphor - - - - -	5 „
Resin - - - - -	1 „
Methylated spirits of wine -	15 „

Most useful for painful or indolent wounds.

I have found this to be a most valuable preparation for open wounds and sores, especially in hot climates. The carbolic acid acts as a stimulant and antiseptic, the camphor is a sedative, the resin leaves a fine coating over the part to protect it, while the carbolic acid and camphor prevent flies from lodging on it.

As a *disinfectant*, crude carbolic acid, "poured from the rose of a common watering can, may be used to the floors of buildings after dilution with an equal weight of water. Rugs, cloths, sacks, harness and stable tools, woodwork and ironwork, &c., may be washed with a soapy solution of the fluid. One pound of soft soap is boiled in a gallon of water, to which two pounds of fluid carbolic acid are added, and after being thoroughly incorporated is ready for use. It is of great importance to note that temperature has much to do with the decomposition of organic matter; therefore, when the carbolic solution is to be used, it should be as near boiling-point as possible—poured over the floors, brushed over wood and ironwork, &c., the rugs and harness being immersed in it, and afterwards scrubbed." (*Armatage.*)

To make a useful and convenient disinfectant, Dr. Voelcker recommends that sawdust should be soaked in as much of a solution of equal quantities of the crude acid and water as it will take up, and then set aside for use. A handful of this carbolized sawdust (sprinkled here and there in a stable) will tend to keep it free from foul emanations.

Carron Oil.

$$\left.\begin{array}{l}\text{Lime water}\\ \text{Linseed oil}\end{array}\right\}\quad \text{equal parts.}$$

An application for scalds and burns.

Catechu

Is useful for checking diarrhœa. It possesses a very

astringent taste. "Good samples are sweet, and free from bitterness and grittiness." (*Finlay Dunn.*)

Dose, 2 drachms.

The action of the Indian variety is weaker than that which is used in English practice.

Chalk.

Prepared chalk is a valuable antacid in diarrhœa; it also forms a mechanical protection for the mucous membrane of the intestines.

Dose, 1 oz.

Chiretta

Is a valuable stomachic. Its properties are very similar to those of gentian. It is common in India. If pounded and mixed in the food horses will soon learn to eat it readily. Chiretta and nux vomica appear to be the only bitters which horses will voluntarily consume.

Dose, 1 oz. twice a day.

Chloroform

Is the agent used for producing insensibility in animals during surgical operations. It should be inhaled with a proper admixture of air. About 4 oz. is required for the horse. Chloroform should be kept in stoppered bottles, which should be covered with blue paper and placed in a cool position.

Colloid, styptic.

Collodion - - - - -	10 oz.
Carbolic acid - - - -	1 ,,
Tannin - - - - - -	½ ,,

Dissolve. (*Tuson.*)

This is an admirable application for abraded surfaces.

Copper, Sulphate of (Bluestone).

See "Bluestone."

Corrosive Sublimate.

Used for skin diseases, and for "coring." It is a deadly poison. White of egg is its best *antidote.*

Epsom Salts (Sulphate of Magnesia)

Is a useful laxative in fevers, chest affections, and in derangements of the liver; its action, however, as a purgative is somewhat uncertain. It may be used when the dung is hard, clay-coloured—indicating suppression of bile—and covered with mucus, or when it is passed out in a slimy state, both of which two last-mentioned conditions show irritation of the bowels. In such cases the employment of aloes is generally inadmissible, owing to the drastic action of that drug.

Epsom salts may be given daily in doses of 4 oz. in the food, or 8 oz. in one dose as a drench.

Ether, Nitrous Spirit of.

See "Nitre, Sweet Spirits of."

Gentian

Is usually employed in powder. *Dose,* 2 to 4 drachms. It may be given in ale or stout with an equal quantity of powdered ginger. It is an excellent bitter.

Goulard's Extract, imitation of.

"Acetate of lead	5 oz.
Oxide of lead (litharge) in powder	$3\frac{1}{2}$ oz.
Distilled water - -	1 pint, or a sufficiency.

Boil the acetate and oxide of lead in the water for half an hour, constantly stirring; then filter, and when the liquid is cold add to it more distilled water until the product measures twenty fluid ounces. Keep the clear solution in well-stoppered bottles." (*Tuson.*)

As an application for cracked heels, mud fever, &c., use 1 part of the solution to 4 parts of olive oil, cream, or glycerine.

Iodine.

See its action in "Diabetes," page 313.

Iodine Ointment.

Iodine - - - - - -	1 part.
Lard - - - - - -	8 parts.

Useful in cases of parasitic ringworm.

Application for Indurated Glands.

Iodine - - -	2 drachms.
Oil of turpentine -	1 oz.
White liniment -	1 oz. (Prof. A. Johnston).

Combine the first two ingredients, and afterwards mix in the liniment. Hydriodic acid is here formed.

White Liniment is made by mixing equal quantities of water and olive oil with the aid of a sufficiency of the subcarbonate of potash to form a soap.

Ipecacuanha.

See pages 365—367.

Iron, Sulphate of,

Should be kept in well-stoppered bottles, for if exposed to the air it will gradually become decomposed. It is a most valuable tonic. Its action appears to be specially directed to improving the quality of the blood. Its use should be discontinued as soon as it causes the dung to assume a dark colour, for this will indicate that an excess has been given, which the system cannot assimilate.

Preparations of iron should not be employed in cases of indigestion.

Dose, 20 grains once or twice a day, mixed in the food.

A solution of 1 lb. to the gallon of water is an admirable *disinfectant* for stables. When brought into the presence of ammonia and sulphuretted hydrogen, the ammonia becomes fixed by being converted into the sulphate; while the sulphuretted hydrogen is decomposed by yielding up its sulphur to the iron.

Only green crystallized sulphate of iron should be employed for internal use. The impure kind will do for disinfecting purposes.

Iron, Tincture of.

The tincture of the perchloride of iron appears to act, when given *internally*, as an astringent to the walls of the bloodvessels, hence its use in bloody urine, &c. In such cases it may be given in drachm doses three

times a day. For diarrhœa, give 3-drachm doses twice a day, combined with an ounce of the tincture of opium. *Externally*, for stopping bleeding, use 1 part to 8 parts of water.

Kerosene Oil

Is used in parasitic affections of the skin.

Laudanum.

See " Tincture of Opium."

Lime.

One part of lime is soluble in 1,500 parts of water. This solution (lime water) is beneficial to foals suffering from a deficiency of bone-forming material, and in diarrhœa when acidity is present. It may be given to yearlings in ¼-pint doses three times a day.

Linseed.

Cold drawn *linseed oil* is the most valuable laxative we possess, and is at all times the safest purgative in the hands of amateurs. It may be given in doses of from 1 to 2 pints. It forms the best vehicle for the administration of turpentine or carbolic acid. In small doses, it allays irritation of the mucous membranes, and appears to be particularly beneficial in diseases of the urinary organs. Its good effects on the skin are well marked. With these objects in view it may be given in doses of 2 oz. mixed through the food three times a day.

As linseed oil is subject to much adulteration, it is advisable to have it made from the pure seed, under one's own supervision if possible.

As *linseed* is frequently adulterated by the admixture of other grains, it should be carefully cleaned before being used as food for horses. It may be given in the form of meal, linseed soaked in cold water, or as a mash with bran. When the first-mentioned method (the one which I prefer) is employed, the linseed is ground up and mixed along with the other corn. If the unbroken seed is soaked in water for four or five hours, it will form a soft mucilaginous mixture. A *linseed mash* is made by boiling 1½ lbs. of linseed for two or three hours until it gets quite soft; 2 lbs. of bran should then be mixed through it, care being taken to have the pulpy fluid thin enough to soak the bran up. Add an ounce or two of salt, cover the mash up and allow it to stand until it becomes cool enough for use. The general objections to boiled food apply equally to boiled or soaked linseed as they do to any other similar mixture. *Linseed tea* may be made by boiling a small quantity of linseed in a full supply of water.

Magnesia, Sulphate of.

See "Epsom Salts."

Mercury, Biniodide of.

Blistering Ointment:—

Biniodide of mercury - -	1 part.
Lard - - - - -	8 to 32 parts.

Nitre (Nitrate of Potash)

Is the usual diuretic which is given to a horse. *Dose*, ½ to 1 oz. may be given in the food daily for a few days.

Nitre, Sweet Spirits of,

Is a very useful medicine. It acts on the kidneys and skin, and is a good stimulant. *Dose*, 1 to 2 oz. to be given in a pint of cold water.

Nux Vomica

Is a most valuable nervous stimulant, tonic, and bitter. Horses will readily eat it when mixed in their food. Strychnine is its active principle. *Dose*, ½ to ¾ drachm once or twice a day.

Opium,

In moderate doses, is a stimulant to the brain and spinal cord. In large doses it is a very powerful sedative. It checks the worm-like motion of the bowels; hence its use in enteritis and in cases of injury to the abdomen. Horses can bear the administration of large quantities of it—even up to an ounce—with impunity.

Tincture of Opium.

Opium in powder - - -	1 part.
Water - - - - -	4 parts.

Digest for twenty-four hours over a slow fire, while keeping the temperature from 150° to 200° F. Then add spirits of wine until 8 parts of the fluid contain 1 part of opium. An ounce of this tincture will be equal in strength to a drachm of solid opium. 1½ oz. of *laudanum* is about equal in effect to 1 oz. of this tincture.

Paraffin Oil.

See "Kerosene Oil."

Potash, Bichromate of,

May be used internally for hastening the development of glanders. The following preparations are recommended by French veterinary surgeons for chronic enlargements about the joints.

(1)	Bichromate of potash - -	1 part.
	Lard - - - - - -	8 parts.
(2)	Bichromate of potash - - -	2 ,,
	Iodide of potassium - - -	1 part.
	Mercurial ointment - - -	32 parts.

Mix without applying heat.

Potash, Nitrate of.

See "Nitre."

Potassium, Iodide of,

Stimulates the glands. *Dose*, 3 or 4 drachms two or three times a day. When added to iodine it increases its solubility.

Poultices

Are valuable as soothing applications, and also for cleansing wounds. They should be large, and should on no account be allowed to get dry.

For applying poultices to the feet, a *poultice-shoe*, constructed as follows, may be used with advantage. Take a circular piece of hard wood, a little longer and

broader than a horse shoe, and about 1½ inches thick. Get one surface of it rounded in a lathe, so that there may be a rise of about ¾ inch in the centre, while the other surface remains flat. Round the circumference of the board have leather nailed so as to form a convenient boot for retaining the poultice, and similar to the one in ordinary use, except that the part which comes on the ground is rounded. The fact of its being round will enable the horse, to whose foot it is applied, to ease the affected spot by throwing weight on the toe, the heel, or on either quarter, as he chooses.

The best *poultices* for general use are those made with turnips, carrots, or linseed meal. Bran, though light and convenient, dries very quickly; this defect, however, may be remedied, by adding to it a little linseed oil, after mixing it with hot water.

To make a carrot or turnip poultice it is only necessary to boil a convenient quantity of these roots and then mash them up.

Bread Poultice.

Take a sufficiency of the crumb, place it in a basin, pour boiling water over it and cover it up for a few minutes. The soaked bread should be then taken out and put into fresh boiling water. It will then be ready for use. The change of water is made so as to get rid of the salts which are contained in the bread.

Charcoal Poultice.

"Wood charcoal, in powder	- -	½ oz.
Linseed meal	- - - - -	3½ ,,
Boiling water	- - - - -	½ pint.

Add the linseed meal to the water, and stir them together, so that a soft poultice may be formed. Mix with this half the charcoal, and sprinkle the remainder on the surface of the poultice." (*Tuson.*)

Linseed Meal Poultice.

"Linseed meal	- - - -	4 oz.
Olive oil	- - - - -	$\frac{1}{2}$,,
Boiling water	- - - -	$\frac{1}{2}$ pint.

Mix the linseed gradually with the water, and then add the oil with constant stirring." (*Tuson.*)

Prussic Acid

May be used externally to allay irritation of the skin.

Quinine.

The expense of this drug will generally preclude its use in veterinary practice; however, in the case of a valuable animal, which may be recovering from a debilitating illness, it might be tried with advantage, in drachm doses, twice a day, combined with a drachm of tincture of iron. Quinine, by itself, will require the addition of a little sulphuric acid to make it dissolve in water.

In India, the Government Cinchona Febrifuge, sold at about a tenth of the price of the sulphate of quinine, might be employed as an efficient substitute for the more expensive and purer form.

Sal-ammoniac.

See "Ammonium, Chloride of."

Soda, bi-carbonate of (Baking Soda),

Corrects acidity of the stomach, allays, in a marked manner, irritation of the mucous membrane of the

intestinal canal, and assists the liver in purifying the blood.

Dose—2 oz. daily in the food.

Spirits.

Brandy, &c., may be given in ¼-pint doses, mixed with water.

Steel, Tincture of.

See "Iron, Tincture of."

Stout.

See "Ale."

Strychnine.

See "Nux Vomica."

Sulphur

Is useful, in the form of sulphurous acid, for fumigating a building. The doors and windows should be closed, and four or five (as the case may be) shovelfuls of burning coals should be placed inside it in convenient positions. On each shovelful of coal about ½ lb. of sulphur should be thrown. The fumes of the sulphurous acid should be allowed to fill the building for a few hours.

Tartar Emetic

Seems, when given *internally,* to stimulate the glands of the skin, whose appearance it consequently improves. It is a very valuable worm medicine. Large quantities, administered internally, of an ounce or more daily for several days, have been borne with impunity. As a rule, about a quarter of a pound, given at one time, will kill a horse. *Dose,* 1 to 2 drachms daily in the food.

Tobacco

Is used as an antidote to strychnine.

Turpentine

May be given internally, as an astringent, in one-ounce doses three times a day. For destroying worms in the intestines it should be given in full doses of 4 or 5 oz. In doses of 2 oz. it is most useful in cases of flatulent colic. It should always be combined with linseed oil or gruel, so that it may not injure the mucous membrane of the mouth, gullet, &c.

White Lotion.

Sulphate of zinc - -	of each 2 drachms.
Acetate of lead - -	
Water - - - -	1 pint.

Is a useful application to wounds.

Zinc, Oxide of,

May be used in powder, as an astringent, for sores; or in the form of ointment (1 to 8 of lard) as an application for cracked heels, &c.

Zinc, Sulphate of,

Is a useful astringent lotion for wounds, &c. It is formed by dissolving 2 to 4 drachms of sulphate of zinc in a pint of water.

CHAPTER XX.

Operations.

It would be impossible for an ordinary amateur, from simply reading this chapter, to perform some of the operations described. Horse owners, however, who are possessed of some practical knowledge, may, especially in India and the colonies, be placed in situations where it is most important for them to learn a certain amount of operative veterinary surgery; I trust, therefore, that the following pages may meet their requirements, and may prove useful for reference.

Backraking

Is the act of unloading the back part of the intestines. It is chiefly resorted to when the horse has been given physic without having been previously put on mash diet. Before performing this operation the arm and back of the hand should be well oiled, while all unnecessary violence should be avoided.

Ball, Giving a.

The method for *preparing a horse for physic* has been described on page 401.

A ball is given as follows:—

The ball may be held between the four fingers of the

right hand, the tips of the first and fourth being brought together below the second and third, which are placed on the upper side of the ball; the right hand is thus made as small as possible, so as to admit of ready insertion into the mouth, The left hand grasps the horse's tongue, gently pulls it out, and places it on that part of the right side of the lower jaw which is bare of teeth. The right hand carries the ball along the tongue and leaves it at the root. The moment the right hand is withdrawn the tongue is released. This causes the ball to be brought still further back. The operator then closes the mouth and looks at the left side of the neck, in order that he may note the passage of the ball down the gullet. Many horses keep a ball in the mouth a considerable time before they allow it to go down. A mouthful of water, or a handful of food, will generally make them swallow it readily.

A running halter should be used, so that the mouth may be quickly and securely closed.

If the operator has but limited experience in giving balls, he should station an assistant on the near side to aid in opening and steadying the mouth, by placing the fingers of his left hand on the lower jaw, and the thumb of the right on the upper jaw. Holding the mouth in this manner facilitates the giving of the ball, and saves the operator's right hand, to a great extent, from becoming scratched by the horse's back teeth.

The balling iron is an instrument for keeping the mouth open. Its name appears to indicate that it is used for the purpose of giving balls, but it is rarely employed for that purpose, as the ball, before the instrument can be removed, is very liable to fall out of

the mouth. It is very useful, however, when an examination of the mouth, or upper portion of the gullet or windpipe, is being made.

A new mechanical balling iron has been lately introduced into practice. It is retained in the mouth by means of a headstall. It is a most ingeniously devised instrument.

Bandaging.

See pages 18, 35, 36, 38, and 39.

Bleeding.

In order to produce a general effect on the system, a horse may be bled from either the right or left branch of the jugular vein. These branches respectively lie in the groove which may be seen just above the windpipe on either side of the neck. If the vein be pressed by the points of the fingers, the portion of it which is above the part pressed will become distended with blood, and the course of the vein will become clearly defined. A point about ten inches from the angle of the jaw may be selected as a convenient spot from which to bleed.

An assistant should hold the horse's head up, so that the vein and the skin which covers it should be somewhat stretched and pressed together. The horse should be placed in such a position that the vein will be clearly defined. He should be prevented from seeing the operation by blinkers, by a cloth attached to the headstall of the bridle, by the assistant placing his hand

over the side on which he is bled, or by some other ready means.

As the branches of the carotid artery lie close under those of the jugular vein, the amateur should use the fleam in preference to the lancet for bleeding, unless he employs a *guarded lancet*, made for the purpose.

The near side is the most convenient for a right-handed man, on which to bleed with the fleam. As blemishes, however, are less likely to be noticed on the off than on the near side, the former may be selected in the case of a valuable animal. The cutting portion of the fleam should be broad, so as to obtain rapid depletion, which produces a much better effect than when the operation is prolonged; the amount abstracted being the same in both cases. The blade should be clean, sharp, and smooth, so as not to injure the vein unnecessarily.

The spot having been selected, the skin immediately above it should be smoothed down with a damp sponge. The operator should open the fleam so that its back should be at a little more than a right angle with the handle. He should hold the joint of the instrument with the tips of the index finger and thumb of his left hand, and should allow the handle to rest on the space between the finger and thumb. If there be a second assistant, he may press the vein, in order to make it more clearly defined; but if there be no one to help, the operator should, by pressing his fingers on the vein, assure himself of its exact position. Having ascertained this, he should place the cutting edge of the fleam in the centre and along the course of the vein, not across it, for a transverse incision might destroy its continuity.

He should then take the blood stick (which is purposely made short and heavy) in his right hand, should strike the back of the fleam a sharp measured blow with it, at a point just above the cutting edge. On removing the fleam, a jet of blood should flow out if the operation has been properly done. If, however, the flow of blood be slight or altogether wanting, the non-success may be due, either to the vein not having been punctured, or to the opening in the skin not corresponding to that made in the vein, on the position of the head being shifted. The operator may satisfy himself on the first point, by compressing the vein a little below the incision; and on the second point, by bringing the head back to the position it occupied when the fleam was struck. If the blow proved too light, although the fleam might have been held correctly, a second incision may be made at the same spot, or a little above or below it. It is the safest plan, however, to make a second attempt on the right side.

When an opening is to be made in the right vein, the operator, before striking, may cause it to become distended by pressing it with the second, third, and fourth fingers of the left hand, while the index finger and thumb hold the fleam.

When the blood commences to flow, the part of the vein just below the incision should be pressed with the fingers in order to prevent the blood accumulating in the loose tissue underneath the skin. The movement of the horse's head should be restricted as much as possible.

The blood should be received into a measure, so that the amount abstracted may be ascertained at any moment.

Bleeding to the extent of three or four quarts will be sufficient in ordinary cases.

When enough blood has been taken away from the animal, the operator should place a finger on the orifice, and should then remove the fingers which were engaged in pressing the vein just below the incision. If this precaution be neglected, the horse will run the risk of being killed by a sudden rush of air into the vein on the compression ceasing abruptly.

In order to close the wound, the operator should press the edges together with the thumb and index finger of his left hand, taking care not to pull them towards himself, lest a tumour of infiltrated blood may form underneath the skin. He should also press the finger and thumb lightly against the neck, in order to steady the part. A pin, held in the fingers of the right hand, should be passed through the centre of the edges of the wound; and some cotton or tow should be wound round the ends of the pin in the form of a figure of 8, and knotted. The head of the pin is pushed down, and its point cut off, so that it may not catch on anything. The pin may be removed after a week's time.

Blisters.

The hair should be closely clipped or shaved off the part to be blistered. The ointment should be rubbed into the skin for ten minutes or a quarter of an hour. The longer the rubbing is kept up, the greater will be the effect. The horse's head, and tail if it can reach

the blistered spot, should be tied up. If the blister does not " rise " next day, some more of the application may be rubbed on, or the effect of a little friction with the hand may be tried. After two days the part may be bathed with warm water, and some sweet oil smeared over it.

Mares "in season," horses inclined to dropsy, those which are in a debilitated state, or are shedding their coats, should not be blistered, for in such cases the part is apt to swell enormously, and its skin to slough. If these untoward symptoms ensue, a mild dose of physic, a pint of linseed oil, for choice, may be given ; or if the animal be weak, and is consequently in an unfit condition to stand purging, half an ounce of nitre may be given in his drinking water. A liniment composed of equal parts of Goulard's extract and sweet oil may be applied to the part.

It is injudicious, in hot climates, to blister during the rainy season, or when east winds are blowing.

One should never blister after a sprain, until all heat and tenderness have disappeared.

Casting a Horse.

There are two methods for casting a horse—that by ropes, and that by hobbles. The former is best for castration, removal of scirrhous cord, and operations for hernia, as the hind legs can be kept wider apart by it than by the latter, which is more convenient for all other operations, is easier of application, and much safer both for the operator and his patient. A piece of soft old grass land is in every respect the most

suitable place on which to cast a horse. A ploughed field, sandpit, or, failing these, a bed of straw may be used. With ropes, straw should not be generally employed, as it is impossible to tell within a few feet where the horse will fall; while with well-managed hobbles he should be made to drop on the very spot on which he had previously stood.

1. *The casting rope* should be thick, soft, and about 30 ft. long. A loop is formed in the centre of it, and is passed, like a harness collar, over the head, so as to fit moderately tightly, while the knot should rest on the breast-bone. This collar is prevented from slipping forward by a strap which is attached to the pad of a surcingle, or the rope may be platted into the mane, at the withers. The free ends of the rope are passed between the fore and hind legs, over the hind pasterns, are brought to the front, one on each side of his shoulders, and then passed through the loop, or through two small loops on it, each being about a foot above the knot. These small loops aid in securing the ropes, and prevent them from slipping down on to the knot. The animal's head being steadied, a couple of men take hold of each rope, and, at a given signal, pull his hind feet from under him, while a push is all that is then required to throw him on to his right side. His head being kept down, *with his muzzle well extended*, an extra turn is taken with the uppermost rope round his near hind pastern, so that he may not succeed in freeing it during his struggles. The leg is drawn up and its rope is secured to the large loop, or to the small one which is on that side. The horse is now turned on to his left side, and his off hind leg is similarly secured.

Care should be taken that the horse is not tied up too tightly, lest, during his endeavours to free himself, he might fracture one of the bones of his back or limbs.

2. *Hobbles*, in their simplest form, are four strong leather straps which are buckled on to the pasterns. Each of them is provided with an iron D for a rope or chain to pass through. One, called the main hobble, has a larger D than the others.

To cast the horse on his right side, pass a loop of soft rope or webbing over the near fore leg, leaving the free end to hang over the off shoulder. The main hobble is put on the near fore leg (or on the off fore if the horse has to fall on the near side), while the remaining three are put on the other legs, the buckles being to the outside. One end of a rope or chain is made fast to the D of the main hobble, its free end is passed through that of the hind leg on the same side, and so on until it returns through the D of the main hobble again. Two assistants hold this rope or chain, while one seizes that which passes over the shoulder. A steady pull on the hobble rope will bring all four feet together, while the shoulder rope will serve to throw the horse on his side.

To release one foot for an operation one has simply to undo the buckle of its strap.

If, when the horse is on the ground, it is required, as for castration, to bring the uppermost hind foot forward, so as, for instance, to expose the testicles, a loop of soft rope or webbing should be placed over the leg just above the fetlock. The free end should be passed over the withers, underneath the base of the neck, and should be brought over the loop, and under-

neath and round the gaskin (just above the hock) of the uppermost hind leg. It should then be brought across the belly of the horse, in an obliquely forward direction, and should be held by an assistant. Another assistant should catch hold of this rope (so as to be able to pull on it) as it comes up from underneath the base of the neck.

Before the horse is cast, his eyes should be covered with some convenient cloth. At the moment of throwing him an assistant should stand at his head to steady it. When the horse is on the ground an assistant should hold his head down, and should keep his muzzle well forward. On no account should the horse be fixed too lightly; nor should any "back rope" be used to bind him, lest he may, during his struggles, injure himself. A twitch is generally applied to the horse's muzzle before he is cast.

Before casting the horse, he should be kept fasting for five or six hours.

Castration.

Colts are usually castrated when about a year old, though, if they have a light crest, or are backward in condition, they may be given a few months, or even a year more time. If proper precaution be observed, there is little danger in castrating "aged" horses, the only special ill result to them being that the operation is apt to cause them to lose their spirit and pluck. Operating under chloroform is, however, likely to prevent this untoward contingency. Colts intended for

saddle and light harness work should be castrated earlier than those destined for heavy draught.

A horse should be in good health and condition before being "added to the list," and should be previously stinted of food for five or six hours, so that he may not injure himself internally when struggling.

In order that the wound may not take on an unhealthy action, one should not castrate during cold or damp weather, or when east winds are blowing.

With the view of avoiding blood poisoning, the operator should see that his instruments are scrupulously clean, and that the surroundings are free from bad odours or taint of any kind; while it would be advisable for him, before commencing, to wash his hands, knives, and clams in a solution of carbolic acid in water—1 to 40. This application might be freely used over the wounded part.

Methods of Castrating.—Those in ordinary use are as follow:—

1. By the hot iron (actual cautery).
2. By twisting (torsion).
3. By the covered operation.

As the third method is the only one applicable when hernia is present, the horse should be examined for that ailment before castrating him.

When operating by the first two methods, the animal may be cast by ropes and turned on his back. If hobbles are used, he should be thrown on his left side, and his off hind leg should be drawn forward in the manner described under "casting." The left testicle is taken in the left hand, and its base is squeezed

between the thumb and finger, so as to tighten the skin over it. If there be difficulty in catching hold of the testicle, the right hand may be used to aid the left. French veterinary surgeons advise that, in such a case, an assistant should lightly tap the muzzle of the horse with a switch or whip, so as to distract his attention, or he may be put slightly under the influence of chloroform. The left testicle being held in the left hand, fingers pointing to the rear, the operator should make with a sharp and suitable knife a bold cut, parallel to the middle line, of about four inches in length, through the skin and coverings of the testicle, which ought to spring out through the opening thus effected. While making the cut, the operator may steady his hand by keeping the tip of the thumb on the testicle. If the incision does not prove deep or long enough, a second or third one may be made. The cut should be well forward, so that any subsequent discharge may readily drain off. Some watery fluid will, on the wound being made, probably squirt out, but that is a matter of no consequence. It does not very much signify if the testicle be wounded. It may happen, especially in the case of old horses, that, owing to previous inflammation, the testicle adheres to the scrotum, and will not easily come out. If this occurs, the adhesion should be broken down by the fingers, or by any convenient blunt instrument, or it may be carefully dissected away. When the muscular contraction ceases for the moment, care being taken that force is not applied, the clam should be passed underneath the testicle and around the cord, close up to the belly. It is now secured by a ring which passes over its handles, by a ratchet, or by

a screw, the first being the simplest plan, while the third is probably the most efficient.

The clam is an instrument used for compressing the cord. It is composed of two pieces of flat steel, having serrated edges and united by a joint. The ends away from the joints are formed into handles.

We may now remove the testicle by the first or second method. If the former be adopted, the scrotum and the inside of the thigh should be protected from the heat by covering them with wet cloths. The operator should take a red-hot firing iron, which should be clean and free from all scales, and should burn through the cord and surrounding tissues at a distance of about half an inch above the clam. The iron should be freely applied to the cut end of the cord, so as to prevent any chance of bleeding. The clam is now gradually relaxed. The hot iron should be reapplied in the event of bleeding ensuing before the clam is finally removed. The right testicle is treated in a similar manner.

If, after the operation, excessive bleeding takes place, treat as directed on page 195.

By the second method, the testicle, after the clam is applied, is simply twisted off by means of a torsion forceps, which is specially made for the purpose. If the operator be unprovided with this instrument, he may catch hold of the uncovered testicle with his hand, and slowly twist it round and round, until the surrounding tissues, cord and vessels, gradually give way.

The great advantage of the torsion method is that it obviates nearly all possibility of bleeding, which frequently follows castration by the hot iron, and is naturally alarming to an inexperienced operator.

The advocates of the actual cautery maintain that it is safer than torsion, which, they say, is apt to induce tetanus. I am not at all satisfied that there is not some truth in this assertion, especially when it is made with reference to castration in tropical climates.

The operation with the hot iron may, on the contrary, give rise, in a few rare cases, to scirrhous cord, especially when the cord has not been severed high enough up.

The covered operation, which should be adopted only when hernia is present, may be performed in the manner recommended by Professor Williams, by including the scrotum and its contents upon the side of the hernia—after returning the intestine into the abdomen—in a strong wooden clam as close as possible to the belly, and letting it remain on until the testicle sloughs off.

It is good practice to keep colts under cover for ten days after castration. The scrotum should be bathed on the third day with warm water, to which a fortieth part of carbolic acid has been added. The wound should be opened up with the finger to allow free escape to any discharge. It is not necessary to do this more than once, unless the scrotum and sheath are very much swollen, when it may have to be repeated. A liberal supply of soft diet and residence in a clean, airy box greatly facilitate recovery. Mountain ponies in Scotland are usually let free immediately after the operation. Casualties on account of this practice are rare.

Catheter, passing the.

The *male catheter* is a long, flexible tube of somewhat smaller diameter than the urethra—the canal by which the urine escapes from the bladder—and is used to draw off the urine when the animal is unable to stale. It is provided with a whalebone stillet to give it rigidity.

The horse should be backraked previous to the operation. If the catheter is to be passed while he is standing up, his two hind legs may be hobbled together, a fore-leg held up, and a twitch applied to his upper lip.

An assistant should draw out the head of the penis from the sheath. If he finds difficulty in inserting his hand, he should oil or grease the back of it. The operator, standing on the right side of the animal and having oiled the point of the catheter, should introduce it into the urethra (see 17, Fig. 14, page 265), and should pass the catheter, containing the stillet, gently upwards until its point arrives at the bend which the urethra makes before it enters the bladder. The catheter may be felt, by the finger, on the medium line directly underneath the anus. When the point of the catheter arrives at the bony prominence just below that part, the stillet should be withdrawn, while the operator should place his fingers on the point of the catheter, so as to depress it, and to cause it to enter the bladder. He should introduce his hand into the rectum, if necessary. While he is thus guiding the catheter, the assistant should push

it upwards, taking care to avoid any roughness in so doing.

The female catheter is a tube of similar material to the instrument used for horses. It is about a foot long, and is not provided with a stillet.

The orifice of the urethra in the mare is situated on the floor of the vagina, four or five inches within the vulva, and is guarded by a large mucous valve which points in a backward direction. The female urethra is wider than that of the horse, and is very short. The urinary valve should be lifted up by the point of the right index finger, and the catheter having been well oiled, should be gently pushed onward until it enters the urethra. The urine contained in the bladder will then find a ready escape.

When the bladder has been distended for any length of time, it becomes partially paralyzed. It is good practice, therefore, both with the horse and with the mare, to keep the right hand in the rectum, and to aid evacuation by pressing on the bladder.

Chloroform, Administering.

It takes about four or five ounces of chloroform to render a horse insensible.

One man should be specially appointed to give the chloroform. The horse should be cast previous to the operation, which may be performed by means of a leather muzzle, inside of which pledgets of tow saturated with the drug may be placed. The chloroform should be renewed according as it evaporates. Or a towel

may be folded in the form of a cup, while a small handkerchief may be placed in its centre to receive the chloroform, which should be poured out a little at a time, care being taken to replace the stopper in the bottle without delay. The horse being kept with his head resting on the ground, may be made to inhale the fumes through his upper nostril, while the lower one may be kept more or less completely closed by the hand, which should be instantly removed, for the moment, if symptoms of suffocation become apparent. The amount of influence which the chloroform has on the animal may be roughly ascertained by noting the degree of insensibility his eye manifests when touched with the finger. The operation having been completed, cold water should be freely dashed over his head and face in order to restore him to consciousness.

Clysters, Giving.

Clysters are given to assist in unloading the hinder part of the bowels. There are various forms of instruments for performing this operation, the most common and convenient being a syringe capable of holding a quart or three pints, and having a nozzle about a foot long. Another kind is a bladder tied to a pipe; while a third form is a large funnel with its small end turned at a right angle. The last mentioned is the most unwieldy form, and is objectionable because no greater force can be applied than that exerted by the weight of the water in the upper part of the funnel. The bladder arrangement is inconvenient, as it

The person who gives the drench should stand on the off side, and should introduce the bottle, or other vessel which holds the medicine, into the mouth just in front of the grinders, at the space which is bare of teeth, and should direct it well back. Only a little at a time should be given—say one or two wine-glasses full, while ample time should be allowed the horse to swallow the fluid. If he make the slightest effort to cough, his head should be instantly lowered, lest he may become choked. His tongue should on no account be drawn out of his mouth and held.

The mouth of the drenching vessel should be broad, so that the fluid may readily escape. An ordinary glass bottle is bad, as its neck is narrow and it is apt to break and hurt the mouth, unless it be covered with leather. A wide and smooth-mouthed block tin vessel, containing about a pint and a half, may be made for the purpose.

"Enemas, Giving."

See "Clysters, Giving."

Firing

Is the application of a hot iron to the skin.

It is surprising how few horses require to be cast for firing; with good assistants, and a little patience, 80 per cent. may be fired extensively while standing, which is much the more preferable attitude, as the operator can then ensure the regularity of the lines drawn. It is impossible, when the horse is on the

ground, to allow for the alteration in position which the skin will have undergone when he will have regained his feet. Holding up one fore-leg and applying the twitch will generally be sufficient to control the animal.

I trust none of my readers will be guilty of the not uncommon barbarism of firing a horse "all round;" of firing a sound leg to make him "stand level," when an unsound leg has to be operated upon; or of firing a sound limb as a preservative measure.

The precautions, as regards health and climate, which should be observed before blistering, are equally applicable to firing.

There are two forms of firing,—(1) by lines; (2) by puncture. For the first method, the ordinary wedge-shaped firing iron may be used. It is pointed, and has a convex and moderately sharp cutting surface, which is about 3½ inches in extent.

The hair should be closely clipped off the part to be fired. The iron should be used at a bright red heat. In order to render the subsequent blemish as little as possible, it is generally advisable, when firing the legs, to draw horizontal lines, which should be from ½ to ¾ inch apart. If a blemish is of no consequence, the iron may be passed almost through the skin, in which case the distance should reach the maximum. Care should be taken at parts where there is flexion, like at the front of the hock and back of the knee, not to fire too deeply, lest a troublesome wound might be the consequence. Firing by lines is the most convenient method for sprains of the back tendons, curbs, ringbones, side-bones, and thorough-pins.

For *puncture firing*, a piece of round iron about $\frac{3}{4}$ inch in diameter, and having a short blunt point, is used. This form is very useful for splints and spavins; while *pyro-puncture* is preferable for structures like the hip and stifle, which are covered with loose skin. It is performed by means of a plate about 3 inches square, and having 9 to 12 pointed studs fixed into it.

Fomenting.

A fomentation is, strictly speaking, the application to the skin of flannel or other material which has been soaked in warm water. In stable parlance, bathing any part with warm water is also called "fomenting."

Fomentations, over large surfaces, are best applied by dipping a blanket or other woollen cloth in hot water, wringing it moderately dry, applying it to the part, and then covering it with a waterproof sheet or dry blanket. When the underneath blanket loses the most of its heat it should be changed for another, care being taken that the animal does not get chilled during the interval. The fomentations should not be hotter than the hand can comfortably bear.

See pages 17 and 18.

Neurotomy.

Though signifying the division of any nerve, this term is usually applied to the operation by which the foot is deprived of sensation.

The nerves which endow the horse's foot with the

power of feeling, pass down each side of the leg, just in front of the perforans tendon (see Fig. 1), immediately above the fetlock joint. The nerves on each side are about the thickness of an ordinary piece of twine, are white, tough, and fibrous in appearance. They are accompanied by a vein and artery, the former being in front, while the latter is usually in the middle. The word *van* furnishes us with a useful *aide-mémoire* by which to remember how these structures lie. Their relative position, however, is not invariably constant.

Neurotomy as affecting a Horse's Usefulness.—"That the tactile sense in the horse's foot is useful, it would be idle to deny; but that it is absolutely essential even to safe progression, no one who has paid attention to the results of plantar neurotomy will maintain. On several occasions, for years I have hunted, hacked, and driven horses which had been deprived of sensation in their fore-feet, and never had an accident with them. Their action has not been impaired by the operation; on the contrary, it was vastly improved, compared with what it had been previous to it. And my experience has not been singular in this respect, as many competent horsemen can give like evidence after long and severe trials of neurotomised horses. The opponents of neurotomy were probably not aware that there is in progression a *muscular* as well as a *tactile* sense." (*Fleming.*)

Indications and Unfavourable Results.—"The effects of neurotomy are certain and durable when it is employed at the commencement of navicular disease, and when the ailment is confined to one foot. It can be easily imagined that it is impossible for the

operation to be successful, when the navicular bone and tendon are destroyed by ulceration." (*Peuch and Toussaint.*)

The same authors strongly recommend the operation in cases of chronic lameness from sidebones; ringbones, except when they are accompanied by bony union of the joint; chronic laminitis; injuries to the hoof, which may have caused a bony formation on the pedal bone, or may have had the effect of increasing, to an unnatural extent, the local growth of the inner horn of the hoof, constant pain from pressure being the result in either case; or from surgical operations on the foot. Professor Williams, on the contrary, considers that horses whose feet have a predisposition to laminitis should not be "nerved."

It is probable that inflammatory action is less liable to be excited in the neurotomised foot than in the sound one.

It is evident that good results from this operation can be confidently expected only when it is performed during an early stage of a foot disease to which it is applicable.

Softening of the back (perforans) tendon and sloughing off of the hoof are two formidable accidents which may happen as results of neurotomy. They are generally confined to cases in which both forefeet have been operated upon. It is commonly supposed that these complications are due to the deprivation of nervous influence which the foot has undergone. M. H. Bouley argues against this view, and advances the facts that after this operation the wound heals in a perfectly healthy manner, and that the secretion of

horn does not appear to be affected in the slightest. M. Chauveau divided all the nerves of the limbs without causing any interference with their nutrition. M. H. Bouley considers that these accidents are due to increased concussion of the hoof with the ground, owing to the foot having lost its feeling, and adds that "in general the effects of neurotomy are much more efficacious and durable in the case of horses used for slow work, than in those of animals which are employed at fast paces."

It appears from the foregoing considerations that the reason why neurotomy of both feet is so much more liable to be followed by unfavourable complications than that of a single foot, is that, in the former case, the horse is without any indication to guide him in regulating the amount of concussion which his feet can safely bear, and is, consequently, liable to knock them about unnecessarily; while in the latter we find, from the fact of his going "sound," that he does not (accidents excepted) put more weight on the "nerved" foot than he does on the one whose sense of feeling is intact.

The Operation.—The horse having been cast by hobbles, the foot to be operated upon should be released, and a noose of stout webbing cord passed over its fetlock to steady it. The nerve on the inside of the leg is the one which should be the first excised, because the wound will then escape contact with the ground or bedding. An incision of about an inch long is made immediately above the fetlock joint, and between the suspensory ligament and back tendon. A little careful dissection of the subcutaneous tissue will disclose the

bloodvessels and nerve. The vein being dark in colour may be easily distinguished. The difference between the artery and nerve is not so readily seen. The former is larger than the latter, and is more "yielding" when pressed by the forceps, while its "throbbing" will indicate the circulation of blood through it. The nerve feels hard and fibrous, and is extremely sensitive when the animal is not under chloroform. The operator having satisfied himself that he has found the nerve, should dissect it clear of any loose tissue, and should then pass a curved suture needle, armed with thick thread, under it, should apply some force to draw it out of its sheath, and should divide it, *as high as possible*, with a sharp, narrow knife. Sensation being now destroyed, the horse will cease the struggles he had made, up to this, whenever the nerve was touched. The free end is pulled out of the wound, and as much of the nerve is cut off at the lower end of the incision as the operator can get at. Unless at least an inch in length of the nerve is removed, sensation may become re-established after a few months by nervous union taking place between the cut ends. The wound may be left as it is, or a suture or pin may be used to bring its edges together. The horse should then be turned over, and the operation performed on the outside. The object of drawing the nerve out is to prevent the cut ends from becoming involved in the healing up of the external wound.

The operator, before commencing, should wash his hands and instruments in a solution of carbolic acid and water, 1 to 40.

The employment of chloroform naturally renders the

operation easy for the amateur, though the veterinary surgeon does not require such aid.

Unless there is considerable bleeding, a bandage is not necessary. With proper precautions the wounds will heal in a few days.

"When neurotomy of both forefeet is indicated, it is prudent to allow a few days' interval to elapse after the operation in one leg before performing on the other." (*Peuch and Toussaint.*)

After "nerving" a foot, special care should be taken, for a couple of months at least, not to subject it to violent concussion, while its shoeing and general management should be always attended to.

Mr. George Fleming says: "Never make the incision through the skin with the knife, but use the ordinary rowelling scissors. Raise a small fold of the integument immediately over the course of the nerve, but transverse to it, and cut through it with the scissors. The incision should not be more than half-an-inch long; there is no hæmorrhage, and the nerve is exposed by a few touches of the scalpel in a few seconds. Incising the skin by means of the knife is clumsy, slow, and not always safe. The only instruments required are a pair of rowelling scissors (I usually shave off the hair previously with a sharp scalpel), a scalpel and forceps, an aneurism needle, and a narrow and short probe-pointed bistoury." (*Veterinary Journal.*)

Mr. Pallin, M.R.C.V.S., remarks that, "I feel sure Mr. Fleming will permit me to add a few words of finish to his excellent and practical description of the operation—namely, the antiseptic course of treatment,

which I have found most successful. The operation is often followed by a troublesome, unhealthy wound, which I have always found most difficult and slow to heal, and sometimes leaving a considerable permanent blemish after it. With this treatment such a thing is avoided, and the great advantage of healing by 'first intention' and without suppuration is gained. It consists in operating entirely dry, and avoiding all contact with moisture. My plan is to put a soft dry towel under the leg to be operated on (which should also be quite dry); then, as the blood comes from the incisions during the operation, it is gently removed with the towel, instead of a wet sponge, as is generally done. After the nerve is divided, the hair at the edges of the wound is to be removed and the parts carefully brought together with a silk suture steeped in carbolised oil, over which is placed a pad of lint soaked in the same liquid, and over all a good, long, dry linen bandage enveloping the whole leg. The horse is kept tied up, and the bandage or dressing not removed for at least four or five days, when the wounds will generally be found healed, and no suppuration or unhealthy granulation to be seen. If they should not be quite healed, replace the dressings and bandages for a few days more."—(*Veterinary Journal.*)

Periosteotomy.

See page 140.

Pulse, Feeling the.

The pulse is usually taken at the *lower jaw*, its character there being better marked than at other convenient situations. The artery (submaxillary) may be felt

underneath the lower jaw, a little in front of the fleshy part of the cheek. On passing the fingers of the right hand over the spot, two vessels can be distinguished lying closely together; one, the duct which conveys saliva from the parotid gland into the mouth; the other, the artery (the facial) which mainly supplies the face with blood. The middle finger should be applied so as to gently press the artery against the inner surface of the bone. The ball of the thumb should not be placed on the outside of the jaw, lest the pulsation of the artery of the operator's thumb might confuse him.

The following description of observing the pulse at other places, has been very kindly placed at my disposal by Professor Vaughan, of the New Veterinary College, Edinburgh.

The pulse at the *sub-zygomatic artery*, which is the easiest of all to feel, may be taken by placing the pad of the middle finger gently on the horse's cheek, a little in front of the posterior edge of the lower jaw-bone, and about an inch below its joint. The proper spot is about 4 inches below the ear.

Very frequently the indication of the *artery of the fore-arm* (the posterior radial) is the one adopted. This vessel is on the inner side of the fore-arm, and may be felt by inserting the hand, from the front, between the breast and fore-arm, and feeling for the slightly prominent head of the bone (radius) just below the elbow joint. The place is described anatomically as being situated just behind the insertion of the flexor brachii muscle. Care should be taken, as the artery is but loosely attached, not to push it out of position when searching for it with the fingers.

Below the hock, we may take the pulse of the artery (the great metatarsal) which runs down the groove between the cannon-bone and the *outer* splint-bone, by gently pressing the finger on the upper third of this groove.

The middle coccygeal artery, which occupies the groove running along the inferior aspect of the tail, will also afford an indication of the pulse. It should be felt for tolerably near the body.

The rate per minute of the pulse of heavy cart-horses is about 35, of well-bred horses about 40, and of small ponies about 45. The younger the animal, the quicker the pulse.

Setons

Are pieces of tape which are passed into various tissues in order to set up irritation in the part, and consequently to draw an increased supply of blood for the repair of some neighbouring diseased or injured structure. The best kind of tape is broad white linen tape, or, in its absence, as broad a strip of calico as the needle will take. A seton needle is a very large, flat, steel needle made for inserting the tape. Those used about a joint, such as the hock, should have the point blunt, in order to prevent injury to the capsular ligament, while the sides are left sharp. Rowelling scissors should be used to cut through the skin at the points of insertion and exit of the seton needle. A handle, to which the needle may be fixed, is employed to force the point through deep-lying, or hard tissues. When the tape is passed through the part, its ends may be tied

together, or knotted separately, an inch or two being left over, while the extra lengths are cut off. The tape, as long as it remains in the part, should be pulled backwards and forwards a little, once or twice every day, so as to keep up a continued state of irritation. Before being inserted, it is sometimes smeared over with blistering ointment, in order to increase the irritation. A seton should not be allowed to remain longer than ten or twelve days in any part in which a subsequent blemish would be a matter of consequence.

Slinging

Is the employment of means for resting a horse when it is indispensable that he should be kept standing, or when he is unable to lie down. In the absence of properly made slings, a good substitute may be obtained by taking a sheet of thick canvas, such as a strong sack, which will suit admirably as regards size, and is generally available. Each end is turned over and sewn firmly on to a piece of wood about the substance of a stable-fork handle. This impromptu sling being passed under the horse's belly, ropes are attached to the four free ends of the pieces of wood, and are made fast to the rafters of the stall, or other convenient supports. Properly made slings are provided with a breastplate and breeching to prevent the horse slipping forward or backward, while a chain block is used to lower or raise the slings at pleasure.

As a rule, slings should but lightly touch the abdomen of the horse when he stands up, so that he may rest in them, or not, as he chooses.

Sutures.

See page 163.

Stripping the Hoof.

See page 94.

Subcutaneous Injections

Are made by a needle-pointed syringe which is manufactured for the purpose. The skin, at the point chosen, being pinched up between the forefinger and thumb of the left hand, the syringe is taken in the right hand and its point is pressed into the fold of the skin at its lowest point, and is carried forward a little way, care being taken not to hurt the flesh. The fluid is then gradually forced out by the pressure of the right thumb, and, after a minute or two, the syringe is slowly withdrawn. The finger should be applied for a little time to the orifice, so as to prevent the fluid escaping.

Solutions for subcutaneous injections may be obtained of uniform strength from veterinary druggists. If the injection hold undissolved particles in suspension, it is very apt to set up inflammation at the part pierced, and bring on an abscess. If the amateur has to prepare the solution, he should carefully filter it a couple of times through blotting paper before using it.

Thermometer, Use of the Clinical.

This thermometer is employed for taking the internal

temperature of the body, which is best done by placing the instrument in the rectum of the animal for about three minutes.

The natural internal temperature of the horse is about 100·5° F.

The indications afforded by the clinical thermometer are unerring guides as to the state of the animal's health at the time, or to what it will shortly be. Thus, if there be a rise of three or four degrees without the animal evincing any other sign of illness, we may be assured that disease, in some form, will, after a day or two, manifest itself in him. A rise of five or six degrees points to a condition of great danger.

The rise of temperature appears to be due to rapid waste of tissue, at a time when the skin is inactive, while the extra heat evolved is not converted into motion, as it would be were the excessive waste due to violent exertion. As might be expected from the contracted state of the muscles, the rise, during an attack of tetanus, is extreme. This thermometer is specially useful for indicating the state of the horse during fevers and other inflammatory illnesses. A fall in the temperature, when it has been unnaturally high, will generally point to a favourable termination of the disease.

Tracheotomy

Is the operation of making an opening in the windpipe, when, from any obstruction in the nostrils or throat, the horse is unable to breathe freely. It may be employed in cases of acute disease, or to give relief to bad roarers. The operation is very simple. A twitch

being put on the horse, and his head elevated, the operator should select a spot, on the centre line of the throat, about a third of the way down the neck where the hard cartilaginous rings of the windpipe can be distinctly felt between the small muscles on each side. (The rings partially overlap each other.) A longitudinal cut is made through the skin and between these muscles—care being taken not to injure them—so as to expose the windpipe. A sharp-pointed knife is then inserted into the centre of one of these rings and a longitudinal opening is made to the centre of the next ring. The incision is thus made, so that, when the opening is no longer required, the edges of the wound may unite without any displacement. If, on the contrary, the rings be cut clean across, they might be found to overlap on the healing of the wound, which would cause a certain contraction of the windpipe at the part operated upon, with the probable result of some impediment to the animal's breathing. A tracheotomy tube may be inserted, or a piece of twine may be passed, by means of a suture needle, through each end of the severed ring and tied on the top of the neck. This will prevent the wound closing during inspiration. *A tracheotomy tube* is a block tin pipe about an inch in diameter and five inches long. It is fixed in the windpipe by means of a plate, and has keepers for straps, which pass over the neck in order to keep it in position, The tube is removed when it is no longer required. No suture or any special treatment is necessary for the wound, which heals up with remarkable quickness.

Twitching.

A twitch is a staff about two inches in diameter, a couple of feet long, and furnished with a loop of cord which is passed through a hole bored at one end of the stick. The thickness of the cord should not be less than that of one's little finger, and should be made of soft material so as not to cut the horse's skin. The loop should be large enough to admit the hand freely.

When applying the twitch, the staff is held in the right hand. The left hand passes through the loop and grasps the horse's muzzle. The cord is then slipped over the fingers and the staff is twisted round by the right hand so that the horse's muzzle becomes tightly squeezed by the cord. When fixed thus, the animal will generally keep quiet during ordinary operations, for if he makes any movement he will be hurt severely by the twitch.

This instrument may be easily improvised by placing a loop of cord round the muzzle and tightening it by a stick passed through it, and then twisted round and round until sufficient compression be obtained.

The twitch is sometimes put on one of the ears, round the lower jaw, over the space bare of teeth and under the tongue, or round the gums of the upper front teeth. The first-mentioned operation is objectionable, as it is apt to make the horse, for the rest of his life, unwilling to have his head touched, while the second is liable to hurt his mouth and render it unfit for the bit for a long time.

CHAPTER XXI.

Age of the horse as shown by his teeth.

Varieties of Teeth.

THE horse has three kinds of teeth, viz.:

1. *Nippers, incisors,* or *front teeth,* which are situated in the front part of his mouth. When he has a full complement, he has six in each jaw—*centre, lateral* or side, and *corner* pairs.

2. *Grinders, molars,* or *back teeth.* Their upper surface or *table* in the lower jaw slopes upward and inwards at about an angle of 25°, while in the upper jaw it has a similar slope downwards and outwards. An effective grinding mill is thus formed, which is worked by the lateral action of the powerful muscles of the jaws.

3. Canine teeth or *tushes,* which are placed singly on each side of both jaws, about ½ inch behind the corner front teeth of the lower jaw, and 1½ inches behind those of the upper. The mare is either devoid of tushes, or has them in a rudimentary state.

Those portions of the gums between the tushes and the back teeth, are called the *bars* or *interdental spaces.*

Teeth are either *temporary* or *permanent.*

The front teeth appear first as temporary or *milk teeth;* the tushes are permanent; while the first 12 back teeth (3 on each side of both jaws) are temporary.

They become replaced by 12 permanent teeth, and are followed by 12 other permanent teeth, which are situated further back in the jaws.

Structure of the Teeth

Teeth are composed of dentine, enamel, and cement. The *dentine* makes up their substance. The *enamel*, which is white and extremely hard, covers the portion of the tooth that is above the gum, and also lines the cavity or *mark* by which the age is determined. There are generally two of these cavities in each molar tooth. The *cement*, which is very soft, and is of a brownish yellow colour, covers the portion of the tooth (or *fang*) which is in the gum. When the tooth comes into wear, the enamel on the *table*, or cutting surface of the tooth is ground down, so that there is an inner and outer circle of enamel on the table, the space between them being occupied by dentine, while the "mark" is lined by cement which quickly becomes discoloured by the food. This peculiar arrangement of the enamel is admirably adapted for the mastication of the horse's forage.

The *milk front teeth* differ from the permanent ones in being much whiter, more wedge-shaped, and in not being grooved on their front surface. Their "marks" are smaller in circumference, and much more shallow.

The *permanent front teeth* are very nearly as broad at the *neck* (the part just above the gum) as they are on their cutting surface. The lower front teeth have one vertical groove, the upper, two grooves on their front faces.

Development of the Teeth.

As the teeth of the horse are developed in both the upper and lower jaw, and on both sides of each jaw in a symmetrical manner, we may express their arrangement, at successive ages, by figures which will denote the position of the teeth on the right side of one jaw. Let us employ small numerical figures to denote milk teeth, and large ones to represent permanent ones. Teeth are numbered from the front backwards.

N.B.—The age is usually determined by the appearance of the front teeth of the *lower* jaw.

The following formulæ will now show the dentition at the different ages.

At or shortly after birth.

Front teeth :—1.
Back ,, :—1. 2. 3.

At this period of the foal's life he has a pair of front milk teeth in each jaw, making altogether 4; while he has three back milk teeth on each side of each jaw, a total of 12, or a total of 16 including the upper 4.

4 to 6 weeks old.

Front teeth :—1. 2.
Back ,, :—1. 2 3.

At this time, the *lateral* front milk teeth appear on each side.

6 to 9 months old.

Front teeth :—1. 2. 3.
Back „ :—1. 2. 3.

The *corner* milk front teeth come through, making a total of 6 in each jaw. There are the same number of milk back teeth.

10 to 12 months old.

Front teeth :—1. 2 3.
Back „ :—1. 2. 3. 4.

The fourth permanent back teeth now appear. The colt with this mouth is *a yearling.*

"*The yearling* is complete in all six incisors, but several well-marked signs distinguish his mouth from that of the two-year-old. The teeth at this period show but little signs of wear. The corner teeth are mere shells, having no inner walls, and all the teeth are in close juxtaposition.

"At *two years old*, the inner wall of the corner teeth has grown up level with the outer wall. The centre teeth show considerable signs of wear, and indeed all the teeth appear somewhat smaller than they did in the yearling. They also stand somewhat wide apart at their necks, on account of the gradual growth of the jaw." (*Sir F. Fitzwygram.*)

2 to 2½ years old.

Front teeth :—1. 2. 3.
Back „ :—1. 2. 3. 4. 5.

The colt is still a *two-year-old* (*rising three*), and will continue to be so until his centre pair of milk front teeth in each jaw fall out.

2½ years old.

Front teeth :—1. 2. 3.
Back „ :—1. 2. 3. 4. 5.

This is a three-year-old mouth.

At this age the colt has dropped his centre pairs of front milk teeth, while the centre permanent pairs begin to appear above the gums. The first and second milk back teeth are displaced by permanent ones. The fourth and fifth permanent back teeth come through.

3½ years old.

Front teeth :—1. 2. 3.
Back „ :—1. 2. 3. 4. 5.

The second front milk teeth and third temporary back teeth are displaced by permanent ones.

The only milk teeth which the *four-year-old* colt has are the corner nippers. The centre nippers are but slightly worn, while the side nippers which are next to the milk teeth are still very shelly.

4½ years old.

Front teeth :—1. 2. 3.
Tushes :—1.
Back teeth :—1. 2. 3. 4. 5. 6.

The horse now loses the last remaining milk teeth—the corner front teeth—while the sixth or furthest back of all the back teeth and the tushes make their appearance. He is now a *five-year-old*, and has got a *full mouth* of 12 front teeth, 4 tushes, and 24 back teeth; total 40.

The corner front teeth are very shelly, and project but slightly above the gums.

5 years old.

The corner front teeth are now fully through. The centre front teeth show some wear.

6 years old.

At this age the *mark* in the centre front teeth begins to disappear. The tush is sharp pointed, and has a distinctly defined edge on its back surface, while it is rounded in front.

7 years old.

The "mark" has left the centre front teeth of the lower jaw, and is but slightly defined in the side ones. The point and edge of the tush have now lost their sharpness.

8 years old.

At this age the "mark" has nearly left the corner front teeth. The tush is rounded and its point blunt.

It sometimes happens that the "marks" remain long after their usual time in the teeth. This may be owing to their exceptional depth, or to the horse having been fed principally on soft food. Chauveau draws attention to the fact that the amount of cement deposited in "the mark," varies considerably in the teeth of different horses, and observes that it may materially influence the period at which effacement of these cavities takes place. The higher fed a horse is, the older does his "mouth" appear.

The "marks" in the upper jaw remain, as a rule, a couple of years longer than do those in the lower one.

After eight years, the teeth of the horse do not

indicate his age with any exactness. The angle at which the upper and lower front teeth meet, becomes more and more acute, the older the animal grows. The front teeth, also, become narrower, when measured from side to side, and broader, from front to rear. They also tend to come into a straight line with each other. The front teeth of a yearling are arranged in almost a semi-circle. The tushes become worn down and discoloured with age.

In order to make a horse appear younger than he really is, "copers" sometimes *bishop* the teeth. This operation is done by cutting with a graver's tool, cavities in the front teeth to imitate the former "marks," and then searing them inside with a hot iron, so as to get the proper amount of discoloration. The absence of enamel round the bishopped "mark" will be convincing proof of the imposture.

There are certain irregularities in the arrangement of the teeth of the horse, which may make it difficult to ascertain his age from the appearance of his teeth. He may have in front *wolf* or supplementary teeth, whose presence will cause the proper front teeth to be worn in a different manner from what they would be, were the others absent. Or the horse may be *parrot-mouthed,* in which condition the upper front teeth project beyond the lower ones. The crib-biter wears and breaks away his centre and side front teeth by the practice of his favourite vice.

Thoroughbred stock take their age from the 1st January; all others, from the 1st of May, except in Australia, Tasmania, New Zealand and the Cape of Good Hope, where all horses are aged from the 1st

August. Thus an English thoroughbred which is born on or after the 1st January remains a yearling until the 31st December of the following year; though another foal which happened to be born a day earlier would be a two-year-old on that date. In determining the age of a horse concerning the date of whose birth we have no record, we should take into consideration the date from which his class is aged. If it be close at hand, he should, in case of doubt, get the benefit of it. But if it be recently gone by, he should be aged the older of the two years. Thus, say a horse, whose class is aged from the 1st January, is examined in October, and shows a mouth with only four milk front teeth, and there were a doubt as to whether he would retain these milk teeth until the following New Year's Day, it would be right to age him as a three-year-old and not as a four-year-old; for, were a mistake made under the former computation, it would be only one of a month or two, while, if under the latter, it would be one of a whole year. It would be manifestly unfair to make him out four years and nine months old, on the chance of his possibly being three years and ten or eleven months old, instead of three years and nine months.

INDEX.

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